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A STUDY OF STRATEGY USE, STRATEGY VARIATION AND
STRATEGY ABSENCE IN THE TASK APPROACH OF LEARNING DISABLED
ADOLESCENTS WITH ORGANIZATIONAL PROBLEMS

BY

GLADENE ROBERTSON



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The undersigned certify that they have read, and recommended to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled **A STUDY OF STRATEGY USE, STRATEGY VARIATION AND STRATEGY ABSENCE IN THE TASK APPROACH OF LEARNING DISABLED ADOLESCENTS WITH ORGANIZATIONAL PROBLEMS** submitted by **Sandra Gladene Margaret Robertson** in partial fulfilment of the requirements for the degree of **Doctor of Philosophy in Educational Psychology in Special Education**.

To my father, sister and friends whose
encouragement and love have seen me
through the times when my own strength
wained

and

To the memory of my mother and her
dreams for me.

ABSTRACT

Research into the specific nature of the task approach of inefficient learners has been limited, despite the proliferation of studies which investigate various approaches to teaching poor strategy users to become efficient students. The intent of the present study was to provide detailed qualitative information on the nature of inefficient learning. Four tasks and thirty interview probes were vehicles for pursuing the research questions. The primary purpose of the tasks was to provide opportunities to observe spontaneous strategy use, elicited strategy use and strategy absence. Tasks included a Piagetian task, a study skill, an errand planning task and an exercise sensitive to frontal lobe dysfunction. A twenty-one item questionnaire modelled after Luria's definition of conscious activity, which included questions on planning, inspection, regulation, verification and correction as well as general organizational skills, was utilized. In addition, a nine-question interview guide elicited information regarding the subjects' knowledge and feelings about their abilities and study habits.

Subjects were seven male adolescents ages 14 to 19 who were designated as learning disabled and who exhibited organizational problems. Poor organizing skills were determined on the basis of teacher nomination and a teacher-completed questionnaire. The methodology employed included structured participant observation and

interview techniques. The data analyzed were the words and actions of each subject. Recordings of data were made on video and audio tape. Transcriptions and subsequent data reduction yielded themes which were examined in terms of the subjects' specific and general knowledge of their study habits and their awareness of how they regulated their learning.

Strategy deployment and metacognitive descriptions were compared in case study formats. Trends and patterns resulted in the formation of grounded speculations: the ability to correctly judge the efficiency of the task approach of another and the ability to verbalize the concept behind the use of a preferred strategy does not insure the ability to implement the strategy; students may have accurate knowledge of their own strategy weaknesses; self-directed manipulation of materials can generate increased knowledge; some underachieving students may blame themselves for their failures; teachers in academic and less academic settings view students' organizational skills differently.

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CHAPTER I

INTRODUCTION

Order is inherent in every aspect of our universe. Much of that order can be defined in terms of natural laws basic to the interrelationships among the various elements of matter and to biological codes which govern the survival of an individual species. The physical laws which apply to nature cannot be ignored without consequence, whether that consequence be immediate or long-term. Hence, predictability of the outcome of an event grows out of the discovery of order. The individual human being, existing in a world which is governed by a myriad of rules composed of the rigid natural laws already discussed, and the more variant standards of unique close environments, reacts to and learns from his surroundings according to rather predictable principles which may be examined and recorded.

Many approaches have been used in examining the "thinking" behaviours of human beings as they interact with and learn in their environments. Resulting from these observations and experiments are a number of theories which attempt to explain the human behaviour most generally exhibited as individuals encounter and work through various tasks and problems. For example, "Gestalt theory claims that there exists in the organism an inherent tendency to apprehend and respond to organized configurations and that this tendency to impose structure is a basic principle of psycho-physiological function" (de Hirsch and Jansky, 1980, p. 227).

Mayer (1977) outlines several schools of thought regarding thinking and learning, which are: thinking based on learning by reinforcement; thinking involving forming and testing hypotheses; thinking involving the restructuring of elements of a problem in a way which differs from the original presentation; thinking which relates new problems to ideas or experiences already familiar to the person; thinking as compared to the sequence of internal changes in information that progress toward a goal; and thinking as dependent on how an individual represents the world and in what ways a person can manipulate or act upon the internal representation.

Whether one adheres firmly to one theory of learning or acknowledges several possible explanations, there is general agreement that there are complex observable learning patterns which are influenced by a range of variables. The ways in which an individual approaches learning experiences may be nondirected or haphazard originally, but techniques revealing plans and strategies usually evolve from these experiences. Such organized approaches to tasks usually result in more efficient and successful learning, encouraging the learner to employ them again in subsequent situations. There is a "sense of order" which comes from experiencing an event repetitively, which is absent when there is variance from the expected pattern. The efficient learner, when faced with a situation of this kind, may look for aspects of the new task to which old strategies may be applied, or seek out new strategies and thus devise methods of carrying out an activity effectively or solving a problem successfully. Such ability to

regulate and control the learning process is more indicative of the approach of the experienced than the novice learner (Brown and DeLoache, 1978). However, given activities which are sufficiently difficult or unfamiliar, the older, more experienced individual may perform much like the beginner. "Ignorance is not necessarily age-related; rather, it is more a function of inexperience in a new (and difficult) problem situation. Adults and children display similar confusion when confronted with a new problem" (Brown, 1980). Apart from those who have not learned because they are too young and those who have not learned because of lack of opportunity, there is a third group: those who, despite seemingly adequate developmental readiness and suitable environmental opportunity, have not learned as they might be expected to learn.

THE TARGET GROUP AND THE ISSUES

Of interest, then, are those individuals who do not seem to benefit from the same experiences which refine the task approach of "normal" learners. They remain the "novices" despite repeated opportunities to respond in situations with basic similarities. In these individuals, there appears to be a diminished ability both in perceiving and in responding to order inherent in the world around them. As well, they experience difficulty imposing order on any event which is out of position or step with the expected.

Those lacking in a spontaneous application of efficient strategy may be taught to use a more effective approach (Brown and Palincsar, 1982). Feuerstein (1979, 1980) has developed techniques and programs

to help those students who have failed to develop the ability to learn and to solve problems (Hobbs, 1980). Meichenbaum (1977) has long been a proponent of the student learning to modify his or her cognitive approach to gain greater efficiency and success. Meichenbaum's theory of cognitive behaviour modification promotes the importance of the student learning to understand and regulate his behaviour (Meichenbaum and Goodman, 1971; Meichenbaum and Asarnow, 1979). It is important to consider, however, that some researchers have found qualitative differences in the task approach of the spontaneous users of efficient strategies and those who are taught to impose strategy (Brown and DeLoache, 1978). Other studies have shown that a comparatively more efficacious task approach may be engendered in learners, not by direct teaching but by providing demonstrations of various strategies and asking students to judge the best approach (Stone, 1980).

Another issue which becomes important in studying strategy-use and regulation of strategy-use is the question of generalization or transsituational application of strategy. There is, of course, a developmental aspect to this phenomenon: with young children frequently constrained by context and adults able to make wide application of their acquired repertoire of rules and regulations (Brown, 1982). According to Brown, Campione and Day (1981), students experiencing academic difficulty also often fail to generalize strategies from task to task and must be taught how to generalize. Thus the phenomenon of the experienced remaining the novice continues unless intervention contains a balance of specific and generalized

strategy (Brown and Palincsar, 1982).

Although it is presently in vogue to study strategy training, little work has focussed on the specific individual approaches of inefficient learners as they complete tasks. Some research in the area of reading has been undertaken in attempting the classification of the strategies involved in comprehending text. In such studies, students read paragraphs and select one statement from a number of sentences to show that they have read with comprehension. Verbal protocols are examined and responses classified according to a previously designed system (Kavale, 1980) or, more acceptably, to a classification system derived from the nature of the response (Olshavsky, 1976-77). Other researchers, while not limiting themselves to the inefficient learner, have investigated the individual differences which exist when subjects approach tasks. Such studies involved problem-solving situations (Simon and Simon, 1978) and social planning tasks (Goldin and Hayes-Roth, 1980).

What seems to be lacking in the literature is a study or series of studies which limit the population being investigated to a group of inefficient learners who, despite the usual life and school experiences, have remained novices at task approach and problem solving. Studies which examine the behaviour of such students on a variety of tasks, such as those reflective of stages of cognitive development, those typical of school assignment, and those involving life-skill and social knowledge would add to the present meager understanding of what inefficient learners do and do not do. It is unlikely that, in carrying out such studies, a homogeneous pattern

will develop which may be said to be common to all inefficient learners. However, if sufficient detail is gathered on the subjects observed, it may be possible, over time, to begin to delineate specific subgroups within this larger group of subjects.

The type of in-depth research necessary to gather such information represents a departure from much of the available literature which discusses inefficient learning of one kind or another. Utilizing large samples of poor and efficient learners and comparing the two groups on a task will often provide statistical proof of learning differences. However, smaller samples of subjects, who are chosen according to rigid standards and whose task performance is carefully documented, may provide valuable contributions to our knowledge of the composite inefficient learners. Kurland and Campione (1982) have said, "... we should focus more of our research efforts on developing a fuller understanding of a few exceptional children rather than persisting with studies of ill-defined subjects" (p.2).

In terms of the current research, the first step in such a focussing was to clearly define the group of inefficient learners to be investigated. The present study sought to observe students of average to above average intelligence for whom some aspect of academic learning had been difficult. The literature has, since the mid-1960's, referred to such children as the learning disabled. The current most popularly accepted definition is from the Education of All Handicapped Act of 1974, which utilizes the National Advisory Committee Definition of 1968:

"Specific learning disability" means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, or mental retardation, or emotional disturbance, or of environmental, cultural, or economic disadvantage. (U.S. Office of Education, 1977a, p. 42478) (Cartwright, Cartwright, and Ward, 1984, p. 193-194)

It is clear from examining the above definition that, even after limiting the population to the learning disabled, one is still faced with a heterogeneous population with widely varying problems. Torgeson (1982b) has advocated research based on rationally defined subgroups to help to overcome the diverse nature of the sample under investigation. For the purposes of the present research, the subgroup which formed the focal point of the study were learning disabled students with organizational difficulty.

Organizational difficulty may be clarified by examining the steps involved in an organized act. Luria (1973b), for instance, describes the organization of conscious activity as including aspects of programming, regulation and verification of activity. More precisely, he breaks the organization into a step-by-step procedure:

Man . . . creates intentions, forms plans and programmes of his actions, inspects those performances and regulates his behaviour so

that it conforms to those plans and programmes, finally he verifies his conscious activity, comparing the effects of his actions with the original intentions and correcting any mistakes he has made. (p. 79)

For the purposes of the present study, a sequence of key words from Luria's descriptor were identified. They were: intention created, plan formed, inspection of performance, regulation of behaviour, verification of activity and correction of mistakes. These key words formed a framework from which behavioural statements evolved. The resultant statements were then used in interviewing teachers regarding students' behaviour and as part of structured dialogues with students in order to probe their metacognitive awareness of their organizational ability. With less rigor, the key words were also used as one model by which verbal protocol and movement patterns were analyzed in an attempt to complete an in-depth study of task approach.

Luria's (1973a, 1980) discussions of the organization of conscious behaviour are part of his description of the role of the frontal lobes in the regulation of mental activity. The similarities between the behaviours of patients with frontal lobe lesions and inefficient students who find difficulty in regulating their behaviour in a goal-directed manner are striking. Brown and Palincsar (1982) have recognized the value of investigating these characteristics:

Poor problem solvers lack spontaneity and flexibility in both preplanning and monitoring. Extreme examples of planning

deficits are described in the clinical literature on patients with frontal-lobe syndrome. Such patients typically omit the initial preaction component (Luria, 1966); they also experience extraordinary difficulty with error correction (Milner, 1964). Such patients have been described as simultaneously perseverative and distractible; they exhibit a failure in intelligent focussing, which is attributed to damage to the supervisory attentional mechanism or executive system (Norman & Schallice, 1980). Many descriptions of learning disabled children's problem solving are very similar: this similarity deserves attention. (Brown and Palincsar, 1982, p. 2)

The regulatory or executive function of the frontal lobes permits what Luria (1973b) refers to as the "formation of active behaviour directed towards the future" (p. 91). Executive processes such as those of predicting, planning, checking and monitoring are believed by Brown (1977) to underlie the cognitive products of the learner and to be "the basic characteristics of efficient thinking in a wide range of learning situations" (p. 98). Thus, a study which is centered on an intense, qualitative description of students' knowledge of and use of their own executive powers should add to an understanding of what task approaches are particularly inefficient and why they are unproductive.

Concern regarding a student's ability to carry out work assignments independently may be present in his elementary school days, but that worry quite naturally intensifies as the student becomes older and more self-direction is expected of him. Organizational difficulties in adolescents are discussed in the literature as they relate to inability to learn from external organization, which is observed daily in the classroom, as well as in

carrying out assignments in an organized fashion (Deshler, 1979). Error monitoring in schoolwork by learning disabled adolescents has been discussed by Deshler, Ferrell and Kass (1978). Blalock (1981) describes the persistence of organizational problems as they extend into the adult years of the learning disabled individual and acknowledges that the implications of such problems to life beyond the classroom doors are significant: "Organizational problems were complained about very frequently and interfered most with writing papers and performing adequately on the job" (p. 45).

The persistence of organizational difficulty beyond childhood is not in itself sufficient reason for choosing an adolescent population to study. At least two other factors have focussed the present study on the adolescent. The first consideration is that it is probable that we cannot expect independently organized strategic behaviour of a more sophisticated nature until late childhood or early adolescence. Choosing students of at least fourteen years of age, for example, yields the opportunity to observe the emergence of a specific strategy which is not present in younger children. According to Stone (1980), while only thirty-two percent of the eleven-year-olds he has studied demonstrated the ability to spontaneously employ a particular Piagetian strategy during an experiment, sixty-five percent of the fourteen-years-olds could do so. Brown (1980) describes the same importance of developmental factors in planfulness: "planful strategic behaviour in the face of school-type tasks does appear to be relatively late in developing" (p. 457). It is also believed that the use of adolescent subjects

would make the employment of verbal protocol analysis more fruitful. Flavell (1976) has applauded procedures which attempt to find out what the child is thinking as he works, but points out that "interrogation procedures are likelier to be productive with older than younger subjects . . ." (p. 234).

THE INTENTION

The present study was designed around the intention of pursuing an intensive investigation of the behaviour and verbalizations of learning disabled adolescents as they attempted a series of tasks. The research paradigm was a case study approach which utilized a variety of techniques, including: focussed in-depth interviews (Denzin, 1970); open-ended questioning and attempts to elicit strategy through demonstration (Stone and Day, 1978; Stone, 1980); verbal protocol analysis (Goldin and Hayes-Roth, 1980) and data condensation (Giorgi, 1975).

Four tasks and two interviews were utilized. The primary purpose of the tasks was to provide vehicles by which to observe spontaneous and elicited use of strategy. Each task was to contribute a unique opportunity to view specific types of strategy or to provide variant contextual settings in which strategy might be employed. For example, the Rods Task was designed to show the subject's adeptness at the use of the control-of-variables strategy which would reflect the presence of formal operational thought structures (Inhelder and Piaget, 1958; Stone, 1980). The Text Search Task provided an everyday school-related assignment which was structured to reveal the

subject's approach to a basic information-gathering study skill. The Errand Planning Task placed the subject in the position of planning a series of errands within a specified time frame. Finally, the Self-Ordered Task presented a planning and monitoring exercise which was sensitive to the right and left frontal lobe dysfunctions.

Extensive information in regards to each subject's processing and academic skills was gathered so that task performance on the four main tasks could be compared to underlying skills. Subjects were learning disabled adolescents who exhibited organizational problems. Poor organizing skills were determined on the basis of teacher nomination and a teacher-completed questionnaire. Task performance was recorded on video and audio tape for further transcription and analysis. Emphasis was on gathering detailed qualitative descriptors of the students' task approaches as well as recording their metacognitive perceptions of their strategy use. Comparisons were made in individual performances across tasks and, insofar as was possible with the small sample used in the present study, patterns of underlying skills contributing to varying strategic approaches were examined. Task behaviours were classified according to already established criteria (Hayes-Roth and Hayes-Roth, 1979; Luria, 1980; Day and Stone, 1980) and by systems which were generated by the nature of the emerging data.

CHAPTER II

SELECTED REVIEW OF THE LITERATURE

INEFFICIENT LEARNING

Children with adequate intellectual abilities, who do not learn despite receiving the same educational opportunities as their achieving peers, have long been of interest to those who study human behaviour. The underlying reasons for the failure of these children to meet expected educational standards are as variant as cognitive processing is complex. There has been a tendency within recent years to take a less focal view of the range of possibilities contributing to failure, and an increasing willingness to entertain the place of "regulating" as well as "processing" cognitive functions in learning difficulty. It is becoming apparent that inefficient and efficient learners do differ, not only in skills involving attention, perception, memory, symbolization and conceptualization, but in their knowledge about cognition and in their ability to regulate cognition (Brown, 1977; Brown, Campione and Barclay, 1979; Brown, 1982; Brown and Palincsar, 1982; Forest-Pressley and Waller, 1984; Reeve and Brown, 1985; Wong, 1985).

It appears that, along with the academic difficulties they experience, an unknown portion of the learning disabled population do not approach tasks with functional efficiency. They do not seem to know "what to do" or "how to do" or "when to do" as they are required to move from an instruction which sets a goal to the successful

completion of that goal. They are frequently even more baffled by tasks which require them to set their own intention and then carry through to the completion of that task. Swanson (1982) has said that "an important assumption is that the rules and specific strategies employed by learning disabled children do not appear to tap or exhaust their intellectual capacities" (p. x).

STRATEGIES FOR ORGANIZED BEHAVIOUR

The punch line of an old vaudeville routine went something like: "Sorry, but you can't get there from here." Those words, or ones similar to them, are often spoken without comedic intent by a number, perhaps even a subgroup, of learning disabled students when they are confronted by assignments which their peers may find to be quite straightforward. These are the students who appear to be disorganized and lacking in strategic approaches to their work, and who may have difficulty formulating and executing even the simplest of plans.

Recognized by teachers and clinicians for many years, these individuals have, until very recently, escaped any in-depth investigation. Textbooks written on the subject of learning disabilities have traditionally contained references to organizational problems in this population. Unfortunately, these references frequently form part of a list of the heterogeneous behavioural or cognitive traits of the learning disabled rather than being part of an expanded discussion (Mercer, 1979; Cartwright, Cartwright and Ward, 1984; Lerner, 1985). However, more detailed

examination of task approach of the disorganized student now exists in a variety of research areas. Segments of the literature on problem solving (Mayer, 1977; Havertape & Kass, 1978; Maker, 1981) are as important to forming a comprehensive viewpoint on strategy as are aspects of recorded study on metacognition (Brown, 1977; Hagen, Barclay & Newman, 1981; Reeve and Brown, 1985); study skills (Cronin and Currie, 1984); and cognitive interventions (Deshler, Schumaker and Lenz, 1984). Nonverbal behaviours require planning and monitoring (de Hirsch & Jansky, 1980; Blalock, 1981), and therefore the inclusion of this area of study can yield valuable information to an understanding of organizational abilities. Certainly the capacity or strategy debate (Swanson, 1982) has become a trendy issue in the literature in the learning disabilities field and promises to add to the understanding of the task approach of the inefficient learner, providing it does not become too dichotomous in nature.

Obviously, all topics related to strategy which are found in the literature have not been researched in equivalent depth. Strategies used in recall have been extensively studied (Flavell, 1970; Neimark, Slotnick & Ulrich, 1975), while certain aspects of imposed arrangement of unit structures in reading, for example, have been less exhaustively pursued (Oakan, Wiener & Cromer, 1971; Weaver, 1979).

Studies such as the ones discussed above provide at least two important services by elaborating upon accepted but minimally described terminology. First, they eliminate the tendency for readers and listeners to ascribe their own concepts to a label. One

term, such as "organizational difficulty", might bear various connotations depending on the background or interest of the individual who encounters the descriptor. For one person the term might refer to a general disarray of personal possessions while to another it may indicate the lack of use of a specific strategy in completing academic tasks. A second advantage of carefully written, elaborated research is that it can make valuable contributions to our knowledge of variant strategy use by groups, and eventually subgroups, of the learning disabled. Such definitive information cannot be gathered in large studies intent only at looking at global differences between groups.

DEFINITIVE BEHAVIOUR

Alley and Deshler's (1979) work is indicative of a more elaborated behavioural description of the organizational problems of an age-defined group within the learning disabled population. They have said:

1. LD adolescents have difficulty perceiving organization in a set of materials, such as notes from class, class assignments, and the textbook.
2. LD adolescents usually do not appreciate the importance of organizing information.
3. LD adolescents do not realize that information can be manipulated or rearranged to produce an organized structure most consistent with the learner's style of understanding, storing, and using information.
4. LD adolescents have difficulty dealing with

an isolated task in an organized fashion.

5. LD adolescents have difficulty dealing with multiple tasks in an organized fashion.

(Alley and Deshler, 1979, p. 210)

It is not always clear from the results of studies investigating task approach just precisely what it is that the inefficient learner is doing when he is not doing what the efficient learner does. A cursory examination of the literature might lead one to believe that learning disabled students are inert when asked to complete activities. Terms such as "strategy absence" (Stone, 1980) or "no attack strategies" (Havertape and Kass, 1978) leave the impression of a void rather than a difference.

A closer look at the investigative work of the two researchers just referenced reveals both quantitative and qualitative differences between the strategies of the learning disabled and the normal groups compared. For example, in the Piagetian-based work of Stone and Day (1978, 1980), Stone (1980), and Day and Stone (1982), strategy absence means the failure to employ the control-of-variables strategy in three out of four trials of a specified task. Control-of-variables means that, when faced with testing many variables, all other variables are held constant while one variable is tested. Quantitative descriptors have centered around the emergence of spontaneous and elicited strategies as well; yet, these operational statements are based on the qualitative analysis of the behaviour of children. Specifically, their behaviour as they attempt to manipulate materials to arrive at a solution to an open-ended

question.

Havertape and Kass (1978), in examining problem-solving techniques of learning disabled adolescents on school-related tasks, describe what they term "deficient strategies" as those which consist of random or impulsive answers without any relationship to the problem requirements" (p. 98). They also quantified a series of descriptors so that they could statistically compare learning and non-learning disabled sample groups.

Student verbalizations were analyzed according to a three-step classification system. Each step in turn has a number of levels of proficiency against which the transcriptions of the students' words could be matched. An outline of the Havertape and Kass (1978) classification system follows:

Step One: Getting the information

- 5 Reads problem correctly
- 4 Reads problem correctly with effort
- 3 Rereads problem several times
- 2 Reads only parts of the problem
- 1 Does not read the problem

Step Two: Understanding the Problem

- 3 Verbalizations show understanding of problem with correct solution
- 2 Verbalizations show understanding of problem with incorrect solution
- 1 Verbalizations show lack of understanding with incorrect solution

Step Three: Solving the Problem

- 7 Uses logical and efficient steps with no error
- 6 Uses logical and efficient steps but with error(s)

- 5 Uses logical and inefficient steps with no error
- 4 Uses logical and inefficient steps with errors
- 3 Begins logical procedure but does not finish problem
- 2 Verbalizes inability to solve problem and does not guess
- 1 Answers problems or proceeds in solution randomly or impulsively. (p. 98)

Havertape and Kass (1978) found differences between learning disabled and normal students at all three levels of their classification system. When "getting the information" (Level 1), only one third of the learning disabled students read problems efficiently. Twenty-five percent did not bother to read the problem at all. Sixty percent of the learning disabled students did not know what was needed or showed they did not understand the problem (Level 2). When solving the problem (Level 3), forty percent of the learning disabled subjects gave random and impulsive answers which did not show a relationship to the requirements of the problem. Havertape and Kass (1978) found that "The learning disabled students who arrived at answers, sometimes correct, used haphazard thought processes" (p. 98).

Studies which attempt to look at subgroups within more widely defined groups are rare outside of the neuropsychological literature, but they are emerging. Stone (1980) and Day and Stone (1982) have investigated specific strategies across age groups and attempted not only to classify performance but to look at the underlying skills of subgroups falling into various classifications.

DEVELOPMENTAL AND PROCESSING FACTORS IN STRATEGY USE

In attempting to gain information on the deployment of strategy, it is important to consider the changes in task approach which occur as children mature. Cognitive development plays an important role in how children deal with the variables which they encounter in explaining certain phenomena (Lunzer, 1968; Stone, 1980; Axia and Nicolini, 1984).

Research by Stone and Day (1978, 1980), Stone (1980), and Day and Stone (1982) forms part of a group of relatively recent studies which are examining the new linguistic and cognitive skills that develop in the years just prior to adolescence and in early adolescence. In particular, Stone has focussed his interest on thinking skills related to information gathering during the developmental period just mentioned. In referring to the initiation of his work, Stone (1980) has said:

Like many others, we were dissatisfied with the utility of Piaget's structured-whole model of adolescent thought. We did think, however, that the problem-solving strategies which Inhelder and Piaget (1958) identified were important aspects of adolescents' approaches to problems. Therefore, like several others (e.g., Siegler, 1976; Linn, 1978), we have focussed on adolescent's use of these strategies themselves.
(p. 86)

Stone and Day found that there were levels of availability of strategy use in the subjects with whom they worked. Some spontaneously used a control-of-variables strategy which could be defined as "directly symptomatic of the presence of formal

operational thought structures" (Inhelder and Piaget, 1958, p. 1055). Others, although not using a control-of-variables strategy on the first trial, after a brief interaction, would demonstrate what Stone and Day (1978) refer to as an elicited strategy. Others, who did not demonstrate a formal operational strategy, were called the strategy absent group.

Stone (1980) found an increase in use of the control-of-variables strategy with age. While at age nine, 75 percent of the normal children had no access to the strategy, by fourteen years, 65 percent were using the strategy spontaneously and only one in ten did not show evidence of the strategy. He found further that although the control-of-variables strategy was not affected by many types of learning disabilities it was more likely to be absent in the LD adolescent than in the normal adolescent. As well, there appeared to be subgroups who had particular difficulty. Most glaring were those who showed significant variances in Verbal and Performance IQs as measured by the WISC-R or WAIS. Average Verbal/Performance splits of 26 points existed for the Strategy Absent Group, while mean spreads of approximately 14 and 10 respectively were found for the Elicited and Spontaneous Groups. More precise identification of the nature of this group revealed that it did not matter in which direction the discrepancy lay and, further, that there were two distinct subgroups within the strategy absent group (Stone, 1980):

One subgroup appears to have what might be termed generalized conceptual difficulties. Their language comprehension skills are poor (as assessed on tasks and as verbal absurdities and paraphrasing figures of speech). Their auditory

memory for connected language is worse than that for random word or number strings. They are good decoders, but have poor reading comprehension. Their social perception skills are poor. In contrast, the second subgroup appears to have relatively intact conceptual skills but poor organizational or attentional skills. (Stone, 1980, p. 92)

Learning disabled adolescents who used spontaneous strategies, on the other hand, exhibited still different characteristics. Of them, Stone (1980) says:

their comprehension of language is good but they have problems in auditory analyses, and their auditory memory for connected language is better than for word lists. Their reading comprehension is generally good on untimed assessments, but their decoding skills are weak and their rate is slow. (p.92)

Stone (1980) stresses that the syndromes he delineates should not be considered definitive. They provide, however, sufficient detail to be excellent comparative models for further research. In attempting to delineate subgroups of strategy users, many factors must be considered. In employing strategy, one is essentially regulating behaviour and much can be learned from the changing role of language in that regulation (Vygotsky, 1962; Luria, 1982). Of equal value are examinations of the function of the frontal lobes in the organization of conscious behaviour.

FRONTAL LOBES AND ORGANIZED BEHAVIOUR

Luria (1963) discusses Vygotsky's theory of interpsychic and intrapsychic forms of behaviour. In interpsychic forms of activity,

the preschool child's behaviour is regulated by his mother's gestures, naming of objects, and directives. Later, the child becomes internally regulated and "wills" his own action, (Luria, 1963). Luria (1961) sees the developmental aspects of the verbal regulation of behaviour as progressing through four stages; first, the regulatory role being external--that of the adult; second, the child's speech itself begins to take on the function of regulation; third, as language develops, what is said is more important than the fact that an utterance is made, and finally, internal speech takes over from external. Gardner (1976) and Luria (1963) point out that the development of "willed" or intrapsychic behaviour coincides with the maturation of the frontal lobes. The frontal lobes are the last to myelinate (Luria, 1980), beginning "to operate and to carry out complex forms of internal regulation of activity" (Luria, 1963, p. 253) several years after birth.

There is some discrepancy in the literature as to the age period in which this behaviour emerges. Luria (1963) has earlier given a range of 4 to 7 years, while in his later work he stated that "forms of action that are organized with the help of one's external and or inner speech becomes established in a child at 3 to 4 years of age" (Luria, 1982, p. 112). Since the cells which make up a large portion of the frontal lobes have been reported by some as not maturing until the late teens or early twenties, it is interesting to speculate as to the role of the frontal lobe in maturing behaviour.

In the frontal lobe patient then, we have an individual whose ability to carry out voluntary programmed actions is disturbed not

because of the motoric dysfunction but because of the fact that speech has lost its directive function in the regulation of action (Luria, 1980). In the case of patients with massive frontal lobe damage, inner speech, the patient's own oral speech, or the directive language of another may both prove to be ineffective in the control of voluntary actions (Luria, 1973a, 1973b, 1980, 1982)

Those who approach the study of learning disabilities from a neuropsychological perspective have long supported their position by drawing similarities between the skill deficits and task performances of individuals with acquired brain damage and those having no discernible history of trauma. Developmental aphasias, dyslexias, dyscalculias and dysgraphias have their counterparts in the study of neurological deficits following documented brain trauma.

The parallels in the descriptions of the role of the frontal lobes in behaviour and in discussions of delineated inefficient learning strategies are striking. According to Luria (1980), the job of the third functional unit, and more specifically, the prefrontal cortex is the organization of conscious activity.

Frontal lobe patients may lack initiative, be unable to plan, sustain goal-directed behaviour, or perceive their own errors (Lezak, 1976). Penfield and Evans (1940), as cited by Penfield (1975), published data to support the position that "major removal of the anterior portion of the frontal lobe results in a defect in the patient's 'capacity for planned initiative'" (p. 19). Pribram and Tubbs (1969) state that "evidence suggests that the frontal lobe of primates is critically involved in the proper programming--the

parsing of the stream of stimuli to which the organism is subjected" (p. 502).

The writings of A. R. Luria on frontal lobe dysfunction have included discussions on the regulation of mental activity (Luria, 1963, 1973a, 1973b, 1980), the regulation of states of activity (Luria, 1973a, 1973b, 1980), the regulation of movements and actions (Luria 1973a, 1973b, 1980, 1982), and the regulation of mnestic and intellectual actions (Luria 1973a, 1973b, 1980), as well as the extensive descriptors of behavioural disturbances previously discussed.

Each of these topics is part of a cohesive and detailed study. Rather than try to deal with each of the outlined areas in a sketchy and grossly superficial manner, emphasis will be placed upon the consideration of goal-directed behaviour, and verbal regulation of volitional action, the areas most relevant to the current work.

This limitation of the parameters of the present study is not indicative of a value judgment on behalf of the writer, but rather reflects a current research interest. The interrelatedness of various aspects of frontal lobe dysfunction, as evidenced in the delineated syndromes discussed in the literature, is recognized. Each individual patient's behaviour will be reflective of the consideration that different parts of the frontal lobes subserve different functions and that the severity of the disorder being discussed may vary depending on the nature and extent of the lesion (Luria, 1980). Yet there are specific behaviours which are of interest here.

GOAL DIRECTED BEHAVIOUR AND THE VERBAL REGULATION OF BEHAVIOUR

One of the principal manifestations of frontal lobe lesion is the disturbance of goal-directed behaviour. Luria (1980) describes the parameters of such behaviour:

A disturbance of voluntary movement and actions arises only when the action has to begin in accordance with a preformed plan, and in particular, when there is ambiguity in its character, and its performance requires inhibition of other actions which are irrelevant and inappropriate to the task. (p. 294)

Luria (1963, 1973a, 1973b, 1980) describes in his patients the replacement of voluntary acts with stereotypic, perhaps habitual, previous behaviours. Luria (1980) states:

the ease with which the necessary actions are replaced by irrelevant stereotyped acts, unconnected with the underlying task and depriving the activity of its selective character, constitute the characteristic features of the patients in the early stages of the development of the "frontal syndrome." (p. 295)

Luria (1973b) cites as an example a patient who, when asked to light a candle, did so by treating the candle as though it were a cigarette, holding it in his mouth and smoking it. In this case, the individual, according to Luria's (1973b) explanation, no longer remembered the action that the verbal command should have engendered and therefore replaced it with a more firmly established habitual response.

"Pathological inertia of previous stereotypes" (Luria, 1980, p.

304) may also be seen in the patient's drawings. Both speech and motor stereotypes used may become perseverative in nature (Luria, 1973a).

Indeed, the verbal commands of others or the verbal mediation of a frontal lobe patient may do little to alter an action. When complex voluntary movements requiring sequenced planning are demanded, and they are beyond the patient with massive frontal lobe damage, he may echolalically repeat an appropriate verbal directive but not be able to carry out the command it dictates (Luria, 1973b). "The patient does not establish the necessary connection between the stimulus and the accompanying verbal instruction, and he does not form a stable conditioned motor reflex" (Luria, 1980, p. 311). Spoken instruction then "lost its regulatory significance" (Luria, 1980, p. 315).

Also of interest is the fact that the patient makes no attempt to correct mistakes he is making in completing a task or action. He is apparently unaware of the mistakes (Luria, 1980).

Pribram (1971) cites an example of one of Teuber's (1964) patients who regularly visited the laboratory on Thursdays:

One Thanksgiving afternoon he set out for the usual visit, saying to himself every step of the way, "Today is Thanksgiving, I should not go to the laboratory, no one is there." The special context of Thanksgiving day, though verbalized, had no effect on his behaviour. Only when he reached the laboratory and found no one there did he return home -- no wiser than he had been at the outset of his journey. (p. 345)

It is frequently impossible for patients with massive lesions of the frontal lobe to perform movements which conflict with those of an

experimenter (Luria, 1973a). They also find it difficult to perform in conditions which require constant switchovers from one program to another (Luria, 1973a).

It appears that the execution of verbally programmed behavioural processes is disturbed by "massive (bilateral) lesions of the frontal lobes; symptoms of this disturbance may be observed also in patients with less pronounced (mostly left-side) lesions of the frontal lobes" (Luria, 1973a, p. 14).

Luria (1980) does point out that getting a patient with a relatively mild frontal lobe syndrome to repeat spoken instructions aloud may improve his performance. In discussing restorative training, Luria (1963) speaks of replacing "the internal correction of the action, disintegrating in the patient, by an external correction, introduced from elsewhere" (p. 249). When the patients display an inability to carry out complex actions with a purpose or to critically evaluate their own behaviour (Luria, 1980), Luria (1963) suggests a situation in which the ". . . instructor sits beside the patient and dictates to him every time he has to stop . . . (and correct an action), the patient subordinates his action to this external control and begins to do the work properly and obtain useful result" (p. 249). External control prevents the tendency to begin tasks impulsively and to continue them without monitoring the produced results.

It would appear, however, that, in patients with less extensive damage, the external speech of another person, perhaps accompanied by directive gesture, can, for specific tasks, lead a patient to

successful completion of a task, replacing the patient's "own failing will by the will of another person and conversion of spontaneous behaviour into reactive afford the principal method of overcoming the defect associated with a lesion of the frontal lobes" (Luria, 1963, p. 252).

The restoration of functions involved in moving from an intention, to a plan, to inspection of performance, to regulation of action, to verification of activity and correction of mistakes (Luria, 1980) can be imposed by providing external verbal and written cues (Luria, 1963) and have educational implications. Educators Brown and Palincsar (1982) have recognized the similarities of the behaviours controlled by frontal lobe function and those described as metacognitive skills.

METACOGNITION

There is no one universally accepted definition of metacognition. Variance in the wording and in the scope of definitive explanations are common enough to cause some concern. Forrest-Pressley and Waller (1984) have said, "At best, it does not appear that the term metacognition has been used consistently by writers in the area, even at the conceptual level, not to mention operational" (p. 3). In reviewing the definitions and descriptions of metacognition, however, it is possible to find commonalities with explanations of the regulatory aspects of what Luria (1973b) terms the third functional unit.

Flavel (1976) has said:

Metacognition refers to one's knowledge concerning one's own cognitive process and products or anything related to them e.g. the learning-relevant properties of information or data Metacognition refers, among other things, to active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective. (p. 232)

Forrest-Pressley and Waller (1984) say that "metacognitive processes refer to the control or executive processes that direct our cognitive processes and lead to the efficient use of cognitive strategies" (p. 2). Brown and Palincsar (1982) distinguish between two broad definitions of metcognition. The first is knowledge about cognition, and the second is the regulation of cognition. Knowledge about cognition "involves conscious access to one's own cognitive operations and reflection about those of others; it is a form of declarative knowledge about the domain "thinking"" (Brown & Palincsar, 1982, p. 1). According to Brown and Palincsar (1982), regulation of cognition involves:

planning activities prior to understanding a problem (e.g. predicting outcomes, scheduling strategies, and using forms of vicarious trial and error), monitoring activities during learning (monitoring, testing, revising, and rescheduling one's strategies for learning), and checking outcomes (evaluating the outcome of one strategic action in terms of criteria of efficiency and effectiveness). (p. 12)

Brown and DeLoache (1978) define metacognition as the voluntary control an individual has over his own cognitive processes. They include in their outlining of the basic skills of metacognition

self-questioning such as: "Did it work?"; "How am I doing?"; and "Does this make sense?" (p. 14-15). For students who do not use such skills spontaneously, Brown (1977) advocates direct intervention.

In reviewing the types of training strategies which can be utilized with inefficient learners, Brown and Palincsar (1982) reiterate their position on optimum training procedures: "an ideal training package would consist of both practice in the use of task-appropriate strategies, instruction concerning the significance of those activities, and instruction concerning the monitoring and control of strategy use" (p. 7). Brown and Palincsar (1982) emphasize that choice of general or specific strategies for training procedures depends on the needs of each individual student and the experiences he or she has had in applying strategies. Yet, as both specific and general self-regulatory skills are necessary in efficient strategy use, a good training program will include both. Obviously, self-regulatory skills transfer from task to task more readily than do specific routines, but they also tend to be weaker. As an alternative procedure, Brown and Palincsar (1982) cite Campione and Armbruster (in press) as suggesting intermediate skill training which is "more general than the extremely specific routines investigated in much of the literature, but more powerful than the weak, self-regulatory skills that have attracted so much recent interest" (p. 9). Brown and Palincsar (1982) refer to the self-instruction work of Meichenbaum (1977) as representative of such intermediate-level skill training.

One of the areas in which Brown et al. (1981) believe students can

be trained to become more effective learners is in their ability to learn more efficiently from textbooks which they are required to read. To achieve this goal, Brown et al. (1981) advocate that students be taught active involvement in the choice of study techniques of self-monitoring strategies. Such involvement would include awareness of:

- (1) basic strategies for reading and remembering,
- (2) simple rules of text construction,
- (3) differing demands of a variety of texts to which their information may be put, and,
- (4) the importance of activating any background knowledge which they may have. (Brown et al., p. 20)

The essence of the Brown et al. (1981) theme is that students receive a level of instruction termed "self-control training" (p. 15). In this training, children are not only informed about the use of a strategy but are also explicitly instructed in how to employ, monitor, check and evaluate that strategy (Brown et al., 1981, p. 15). When eleven-year-old mildly retarded children were taught the self-control strategy in a rote recall task, their recall was enhanced, they were able to maintain the strategy over a series of post tests and could transfer their learning to a more school-like situation (Brown et al., 1979). It should be emphasized that eight-year-old mildly retarded children showed quite a different pattern, not utilizing or retaining the strategy in the same manner as the older students (Brown et al., 1981). Once again, the variant performance of children of differing ages in employment of a strategy has been evidenced.

The ability to train students to generalize strategies (Brown et al., 1981) and to retain training for periods of up to six months (Brown and Palincsar, 1982) is most encouraging. Yet perhaps it is not necessary to train every student who does not apply a strategy on his own volition.

STRATEGIES: SPONTANEOUS, ABSENT OR DORMANT

In reviewing the literature, Brown and Palincsar (1982) refer to a lack of spontaneity and flexibility in the preplanning, monitoring and various types of attentional strategies used among learning disabled children. In her work, however, Brown (1977, 1980, 1982) tends to take the student from lack of strategy use to strategy training. Day and Stone (1982) however, see another "state" between spontaneous use and absence in which the control-of-variables strategy is just "under the surface" and can be elicited through a demonstration of strategy use. For younger, sixth grade students, questioning (which forced them to choose between the "better" of two pairs of testing a particular variable) and a further requirement to make a verbal explanation (of why the pair was better) played a key role in elicitation. For older children, second opportunities to attempt a control-of-variables task in themselves resulted in improved strategy use (Day and Stone, 1982).

Stone's (1980) and Stone and Day's (1978, 1980) "elicited" strategy group seem somewhat analogous to the group which Flavell (1970) referred to as production deficient. "A production deficiency is said to exist when the child does not spontaneously produce a task

suitable mnemonic but if trained to do so can use the mnemonic to improve performance" (Brown and DeLoache, 1978, p. 5). Flavell (1970) saw these difficulties in production as more than a "you have it or you don't" situation: "Mediator production is not an all or nothing affair, however, developmental intermediaries ("production inefficiencies") between nonproduction and efficient production are probably the rule rather than the exception" (p. 208).

It appears that a general pattern of performance exists between efficient and inefficient learners over a range of tasks. Seemingly in some students, latent skills can be elicited without specific training. Such patterns have also been noted by Meyer et al. (1980) in their work studying how ninth graders organize their recall after reading a passage. They have found that use of the text's top level structure in organizing recall is highly correlated with, if not causative in, the recall of information. Top level organization includes: problem/solution, comparison, antecedent/consequent, description and collection elements. When asked to write recall protocols, students rated as good comprehenders tended to use the same top-level structure as the author of the prose they were reading. However, most students with low comprehension skills did not utilize this structure. As well, students who utilized the author's organizational structure were better at discriminating between information consistent with the passage meaning and information based on the same topic but not from the paragraph in question. Meyer et al. (1980) anticipated and found three groups which appear to correspond to the spontaneous, elicited and strategy absent groups

of Stone (1980):

In contrast to good readers, poor readers were expected to approach text without knowledge of the text's organization and no effective strategy for utilizing the top-level structure of a passage In addition, a group of readers (labelled comprehension underachievers) were identified who could plausibly fall into Flavell's (1977) production deficiency category; that is, readers who could use the top level in test, but not without explicit prodding. (p.77)

Research into reading skills has yielded important information on how children impose and are affected by the imposition of structure in their reading activities. Hoskins (1986) advocates that we teach children text patterns or organizational patterns (i.e., cause-effect) but that we also teach the superstructures, the understanding of which allows the reader to control the text.

EXTERNAL ORGANIZERS IN READING ACTIVITIES

The sensitivity of good reading comprehenders to the top-level structures used by authors has been discussed (Meyer, et al., 1980). Other studies have also examined the relationships between the text and the reader. Frase (1969) found that high school graduates had improved and more organized recall when reading paragraphs about chessmen organized by concepts over those organized by attributes or by randomization. Oakan et al. (1971) state that "some difficulties in reading comprehension can be accounted for in terms of a mismatch between the reader's typical patterns of linguistic organization and the organizational patterns required for the comprehension of the

particular written material" (p. 72). Cromer (1968), as cited by Oakan et al. (1971), divided poor comprehenders into two groups: those with vocabulary skill deficits and those with organizational problems. It was found that children experiencing the latter difficulty read word by word rather than in meaning units. Researchers have also resorted to actual manipulation of the sentence structure to study the factors affecting comprehension. By organizing selections into meaningful phrases separated by spaces, Oakan et al. (1971) found that the comprehension of poor readers who did not have vocabulary problems increased significantly. They concluded that "if poor readers typically do not organize their input into efficacious patterns, they may have considerable difficulty understanding what they have read" (Oakan, et al., 1971, p. 77). Imposing an organization on the material resulted in comprehension improvement only with the inefficient readers. Good readers spontaneously organized words into units of meaning.

Textbook organization can contribute to less difficulty for students in specific content areas. Armbruster and Gudbrandson (1986) believe that with the implementation of "simple rules such as 'Headings signal more important or general information than subheadings,' the need for teaching reading skills would be significantly reduced." (p. 47).

Effective use of the more structural aspects of textbook organization has long been recognized as the mark of a good reader. Being able to use a textbook as an information source is a skill essential to academic success. "Beginning in the intermediate

grades and continuing through high school and college, a large part of a student's school time is spent reading textbooks to acquire information" (Adams, Carnine and Gersten, 1982).

A difficult task for many learning disabled adolescents and adults is "tackling" a textbook in order to do independent study or reading. "Secondary school students often approach content textbooks passively and negatively, with little understanding of what to learn or how to learn it" (Davey, 1986). These students seem in many cases to lack any kind of systematic approach to the eliciting of the information from the printed page in ways which will add to their knowledge of the subject matter and assist in their remembering facts to integrate into their general knowledge for examination purposes. While one might argue that such strategy deficiencies should be expected from individuals who have, in many cases, spent the years in which their classmates were developing such skills struggling with the more elementary tasks of decoding, that argument may in some cases lead to the dismissal of evidence of organizational or strategy deficits and subsequent attempts to ameliorate them. "A crucial issue in content areas reading is how to instruct students so that they are able to study and learn from their texts" (Moore and Readence, 1983). Toward that end, instruction in effective study techniques seeks to increase student awareness of how textbooks are organized and how they can generate study questions relevant to the content. Approaches such as the SQ3R Technique (Robinson, 1941) and the PQRSST Study Plan (Spache and Berg, 1966) are examples of such methodology. Other approaches include the interactive Request

procedure (Manzo, 1979); the textbook activity guide (TAG) approach (Davey, 1986); and a writing strategy to be used in studying and learning in the content areas: PORPE (Simpson, 1986).

While in the literature there is acknowledgment of study skill deficiency (Adams et al. 1982); devotion of time to students' effectiveness in comprehension (Bos, 1982) and of recall (Meyer et al. 1980); and description of procedures which train students to extract information from texts (Brown et al. 1981), little detailed observational documentation has been produced regarding the basic task approach of inefficient students when they approach texts. From Durkin's (1978) work it would appear that in some elementary school settings little instructional time is devoted to study instruction. It would seem that documentation of explicit deficiencies in independent study skills might be a good first step before implementation of instruction. Here, of course, the issue of readability is of great importance. Kibby (1979) has cautioned:

If teachers do not recognize that a child must automatically process some proportion of the words in a passage before experience and language skills can be applied, then a gross misinterpretation of the child's reading strengths and strategies may result. (p. 391)

Kibby (1979) is convinced that a great proportion of errors labelled as failure to use syntactic and contextual clues are merely problems of automatic word identification. Caution regarding interpreting reading problems as study skill problems is equally appropriate.

It would seem that individuals who experience problems in planning and regulating their behaviour in problem solving and basic

school activities might also experience difficulties in organizing themselves effectively at home or on the job. If organizational problems are pervasive, it was felt that the present study might expand beyond the school room to tap some skills required in day to day existence.

DAILY LIVING

Indeed, organizational problems and strategy deficits can interfere with the routine of life's activities outside of the task demands of the school (Blalock, 1981). Hayes-Roth and Hayes-Roth (1979), Hayes-Roth (1980), and Goldin and Hayes-Roth (1980) have investigated individual differences in the planning abilities of adults by utilizing a thinking aloud protocol produced when an individual plans a hypothetical day's errands. They define planning as

the predetermination of a course of action aimed at achieving some goal. It is the first stage of a two-stage problem-solving process. The second stage entails monitoring and guiding the execution of the plan to a successful conclusion. We refer to these two stages as planning and control. (Hayes-Roth and Hayes-Roth, 1979, p. 276)

Hayes-Roth and Hayes-Roth (1979) base their work on an opportunistic model which draws on cognitive psychology and artificial intelligence. It is proposed as a "useful framework for future investigations of the planning process" (p. 308). The model consists of independent cognitive specialists which generate decisions during the planning process. These specialists record their decisions on a

blackboard which contains five conceptual planes: plan, plan-abstractions, knowledge-base, executive and meta-plan. Each plane is in turn made up of a number of levels.

Subjects are given a map and a brief description of their whereabouts, the time, some fixed time commitments later in the day, and a list of errands. There are purposefully more errands included in the list than it would be possible to complete in the time frame. "The subject's task was to formulate a realistic plan indicating which errands he would do, when he would do them and how he would travel among them" (Hayes-Roth and Hayes-Roth, 1979, p. 277).

Using the opportunistic model, Goldin and Hayes-Roth (1980) found that there was a clear pattern of individual differences between good and poor planners and that those differences consisted mainly of the degree to which the planners consciously monitored and controlled their planning. Among the differences between good and poor planners were the following:

- good planners showed more structured and flexible planning. "Good planners control their planning behavior with consciously generated metacognitive strategies and criteria while remaining open and responsive to a variety of data" (p. 37)
- good planners were better at maintaining their focus of attention.
- good planners reviewed and evaluated their previous decisions more frequently.
- good planners tended to be more conscious of time constraints and of spatial clusters of errands.
- good planners had larger repertoires of planning and knowledge, and used their knowledge

more effectively.

In this series of studies there is an abundance of comparative descriptive data which make the qualitative differences of the subjects more evident than in much of the research which investigates strategy.

SUMMARY

In summary, as evidenced from the preceding selected review of the literature, there is a considerable lack of precise information on the task approach and strategy use of clearly-defined samples of adolescents who are not learning efficiently. Existing in the literature are attempts to outline organizational difficulties of learning disabled high school students as they attempt to study and complete assignments (Alley and Deshler, 1979). As well, a study has examined the problem-solving techniques of learning disabled teenagers on school-related tasks using more specific performance criteria (Havertape and Kass, 1978). Research in which deployment of a single defined strategy is related to underlying processing abilities is rare but may be found in the work of Stone (1980). Developmental factors in the ability to regulate behaviour have been recognized (Lunzer, 1968) as has the role of the frontal lobes in the organization of conscious activity (Luria, 1980). Brown and Palincsar (1982) have acknowledged similarities between poor problem solvers and patients with frontal lobe syndrome.

Of interest in the proposed study were those individuals who do

not seem to grasp just how to go about school tasks, regardless of numerous exposures. By some definitions, these might be considered to be strategy-absent individuals. However, it appeared from the literature that, among those who have difficulty employing strategies, there would be those from whom strategies might be elicited (Stone and Day, 1978). The existence of this "third group," who appear to destroy the theory of strategy being either present or absent, has been noted by Flavell (1970) in his study of memory and by Meyer et al. (1980) in their study of reading comprehension, as well as by Stone (1980) in his work on Piagetian tasks.

The present study presented subjects with tasks which allowed the researcher to determine strategy presence or absence. In turn, attempts to elicit strategy gave an opportunity to see if three groups would form. The three projected groups were thought to be composed of those who would use strategy spontaneously, those who would employ strategy after elicitation, and those who would not use a described strategy either before or after attempts to elicit a particular behaviour.

Further, through qualitative description of subjects as they completed a variety of tasks and by conducting in-depth interviews, an attempt was made to determine the nature of the organizational skills and strategy use of learning disabled adolescents and the extent to which those behaviours were specific or transsituational.

CHAPTER III

RATIONALE AND DEFINITIONS

RATIONALE

The literature appears to reveal a definite difference between good and poor students in their ability to organize themselves as they complete tasks (de Hirsch and Jansky, 1980; Blalock, 1981) as well as in their ability to profit from the inherent organization that exists within the materials with which they work (Oakan, Wiener and Cromer, 1971; Meyer et al. 1980). Some of these poor students, despite repetitively experiencing the same situations and opportunities that are afforded to their classmates, remain novices in solving problems in which they might be expected to be experienced performers. It seems apparent that inefficient learners can be trained to become more efficient (Alley and Deshler, 1979; Brown et al. 1981; Wong, 1982) but that they may generalize their learning from task to task only with further specific training (Brown and Palincsar, 1982). Furthermore, it would appear that qualitative differences in task performance remain between those who use a strategy spontaneously and those in whom the strategy is trained (Brown and DeLoache, 1978) or elicited (Day and Stone 1982).

Of interest here was a detailed examination of the task approaches of inefficient learners. Of equal concern was the question of how the strategies of inefficient learners with

organizational problems varied from task to task and from individual to individual.

Two rather extensive bodies of literature exist in the research which investigates strategy use by the learning disabled. One of these probes is comprised of studies which show consistent evidence that learning disabled children do not spontaneously supply strategies to many tasks (Torgeson, 1979, 1980, 1982a; Wong, 1979, 1980; Loper and Murphy, 1985). In examining the lack of strategy use in the inefficient learner, Torgeson (1982a) found that in 40 studies published between 1977 and 1982, which discussed learning disabled children's use of information processing strategies, there was convincing evidence that "learning disabled children as a group do not engage readily in certain organized, goal-directed strategies that aid performance on intellectual tasks" (p.46). The second major thrust in language disability strategy-use investigates efficient methods of training children and adolescents, who do not use strategy, to begin to employ strategies efficiently and/or generally (Towle, 1982; Gordon and Graun, 1985; Meichenbaum, 1985; Reder, 1985; Deshler and Schumaker, 1986; Weinstein and Mayer, 1986). In pursuing the effectiveness of strategy training Wittrock (1986) has stated:

The teaching of learning strategies and metacognitive strategies has been found also to be effective in educational settings to facilitate attention, motivation, learning memory, and comprehension, as well as remediate some learning disabilities. (p.310)

A point frequently overlooked in both the areas of investigation just outlined is the impact of one of the essential qualities of the

term learning disabilities--namely, that the wide and variant characteristics embodied by the descriptor mean that what may be true of the group in general is not necessarily true of individuals or subgroups within that larger group. If researchers and practitioners take the stance that because a) the learning disabled do not use strategies spontaneously and that because b) strategy-training is beneficial to the learning disabled, that, therefore c) all learning disabled should be given strategy training, the problem may have been viewed too simplistically. Researchers have an obligation to probe more deeply into the issue. Torgeson (1982a) states clearly that not all the learning disabled have strategy deficiencies and therefore it must follow that all do not need strategy training.

Interestingly, although there is strong evidence that some learning disabled students are not efficient strategy users and despite the rush to train poor students to use more rewarding approaches to their work, little documentation exists regarding just what inefficient learners do which is so unrewarding. Torgeson (1982a) has said that "Unfortunately we have a much better description of what learning disabled children do not do than what they do" (p.48). An examination of the literature appears to indicate that Torgeson's concern is shared by very few researchers. Although this point was, in all probability, the stimulus behind the Havertape and Kass (1978) study from which behavioural descriptors of task approach resulted.

The writer, in reviewing the literature, became increasingly concerned about the mushrooming numbers of studies which advocate

specific and general strategy training with little or no concern about what the learner is or is not bringing to the task at hand. It is just this lack of information which the present study chose to address through qualitative, descriptive methods. These methods in turn, allowed a close examination of task performance as well as metacognitive awareness and regulation of task performance.

Although, as stated previously, the Havertape and Kass (1978) study initiated such a probe, it was believed that more precise qualitative information could be gathered using a more specifically defined sample. Stone (1980) has recognized the importance of acknowledging the heterogeneity of the learning disabled population and the resultant obligation to relate behaviours to subgroup characteristics. Stone and Michals (1986) have stated "...we need to consider the nature of the learning disability even when examining an area of performance as general as problem solving..." (p.307). In order to properly address the issue of heterogeneity in studying the learning disabled there are at least two broad approaches which might be considered. The first approach would be to study a very large group as they complete carefully defined tasks and to determine subgroup differences on the basis of the relationships between characteristics brought to the task, and the relative efficiency of the subjects' task performances. Such an approach has been utilized with increasing popularity in the study of dyslexia (Mattis, 1981; Satz and Morris, 1981; Hynd and Cohen, 1983).

A second type of broad approach to dealing with a group with divergent characteristics is to limit those studied to a rationally

defined subgroup (Torgeson, 1982b) in which the sample is limited beyond the parameters of the accepted wider definition of the group as a whole. As previously discussed, while it has been acknowledged that, as a group, the learning disabled do not spontaneously employ goal-directed strategies (Torgeson, 1982a; Loper and Murphy, 1985), it must also be recognized that studies which point out spontaneous strategy-use in some learning disabled individuals do exist (Stone, 1980; Torgeson, 1982a). To obtain a rationally defined subgroup with strategy deficiencies, it would be important to focus on those subjects who would be most likely to exhibit problems in organized task approach.

Since it was the intent of the present study to document some of the characteristics of inefficient task approach, use of in-depth qualitative research on a small carefully defined subgroup seemed the most promising approach. Teacher description of students based on specified organizational criteria and teacher nomination assisted in the refinement of the sample.

In the present study, an attempt was made to descriptively document the task approaches of the disorganized, inefficient learner by utilizing and analyzing not only an ongoing verbal description by the subject as he completed tasks but by incorporating manipulative task elements which could be directly observed and analyzed. Set descriptors were utilized as frameworks on which to trace individual behaviour patterns. These descriptors were also used as the basis of questioning for metacognitive and third-party behavioural judgement. It was important as well, however, that the researcher leave herself

open to observations which were unhampered by preconceived notions. Fareed (1972) warns about forming protocol data into previously determined classificatory schemes. The specificity of classification schemes must be carefully considered. Olshavsky (1976-77) found that using broad descriptors tended to eliminate differences between groups. Any classification descriptors can be quantified if such data is required for statistical comparisons (Havertape and Kass, 1978; Goldin and Hayes-Roth, 1980). However, it is important that classifications are more descriptive than nominal. Relabelling and sublabelling those who are already labelled--perhaps mislabelled--would be a meaningless activity.

Of some use in developing meaningful classifications of behaviour was the literature describing those who have difficulty regulating and monitoring their activities because of brain lesions (Luria, 1973a, 1973b, 1980; Milner, 1964, 1983; Petrides and Milner, 1982). As well, those studies which look closely at the underlying processing skills which may contribute to a certain strategic approach were of value (Stone, 1980; Stone and Day, 1978; Day and Stone, 1982).

OPERATIONAL DEFINITIONS

The organization of conscious activity: Given an intention, the strategy may include: the formation of plans and programmes of action; the inspection of the performance of an action; the regulation of behaviour so that it conforms to the established plans and programmes; the verification of the action by comparing

the effects of the activities with the original intentions; and the correction of mistakes. (After Luria, 1980).

*Planning: to create or to appear to create a method of procedure.

May be done overtly or be implied by such behaviour as a thoughtful pause between hearing a goal and beginning to move toward that goal.

*Inspection: a careful or critical examination of task performance.

*Regulation: to adapt behaviour to conform to a plan--ongoing.

*Verification: a comparison of the effects of the activities with the original intentions.

*Correction: to redo, after comparing the effects of the activities with the original intentions.

Strategy: a sequence of steps followed in the organization of behaviour.

Spontaneous strategy: the implementation of a specified strategy (defined qualitatively or quantitatively) on the first trial of a given task.

Elicited strategy: the implementation of a specified strategy (defined qualitatively or quantitatively) after failing to use the said strategy on a first trial of a given task but using the strategy on a second trial subsequent to having watched, compared and judged the better or best of a series of demonstrated strategies of varying effectiveness.

*This characteristic may be manifested verbally or nonverbally by a variety of behaviour which shall be labelled at the discretion of the researcher.

Strategy absence: not implementing a specific strategy (defined qualitatively or quantitatively) on the first trial of a given task or on trials subsequent to evaluating demonstrations of the strategy.

Control-of-variables strategy: the employment of an unconfounded test of four of the six variables present in the Rods Task; namely: material, length, diameter, base, amount of weight, and position of weight. The subject must name the variable as well as perform the test of that variable.

Demonstrated strategy type 1: least efficient demonstration.

Demonstrated strategy type 2: moderately efficient demonstration.

Demonstrated strategy type 3: most efficient demonstration.

Observed strategy: a sequence of steps followed by an individual subject in completing a task.

Specific strategy: a sequence of steps followed by an individual subject in completing a task and peculiar or limited to the completion of that single task or type of task.

Transsituational strategy: a sequence of steps followed by an individual subject in completing a task, which may be followed in or generalized to a number of tasks or problems.

Disorganized student: one who is identified by teacher nomination and by a rating score of 45 or below on the Questionnaire On Organizational Skills. Both these criteria must be met by 1 of 2 teachers polled.

Organized student: one who is identified as organized by teacher nomination and by a rating score of 56 or above on the

Questionnaire On Organizational Skills. Both these criteria must be met by 1 of 2 teachers polled.

DELIMITATIONS

The present study varied in focus from much of the research dealing with metacognitive skills in school-aged children. First, the focus was on adolescents, not younger children. Second, the tasks chosen were neither memory tasks nor common academic endeavors such as reading. Thirdly, no attempt was made to teach strategies or to use intervention techniques. The frequency of studies on younger children, in memory or school subject-related tasks, in which self-regulatory training is employed has been fairly extensive (Loper and Murphy, 1985). As stated previously, a major purpose of the study was to determine the nature of inefficient strategy use by LD adolescents through observation and protocol analysis techniques.

LIMITATIONS

1. The inclusion within the present study of four detailed tasks, thirty questions regarding study skills and organizational habits, as well as a battery of ability and achievement tests, gives the researcher and the reader a vast number of facts to weigh and interrelate. While all the facts gathered were of value and the process of seeking out patterns was a fruitful endeavour, the study itself becomes complex. Tabular formats have been used extensively to help to clarify the text and the data analysis procedures.

2. The Questionnaire on Organizational Skills purports to measure six aspects of organizing conscious activity: general organization, planning, inspection, regulation and correction. The three or four questions comprising each of the six areas were devised by the author as being reflective of that skill. No field work outside of the pilot study, which was later incorporated into the present study, was done. The reliability and validity of the instrument is unknown.

CHAPTER FOUR

METHODOLOGY

THE STUDY GROUP

An arbitrary number of five was chosen as a reasonably sized group on which to test the workability of the tasks devised for the present exploratory study. The subjects were chosen in the manner outlined under screening procedures.

The first step in choosing subjects for the exploratory study was to limit the population from which the sample was to be drawn to students who were receiving or who had recently received assistance in the Learning Assistance room at M. E. LaZerte High School in the City of Edmonton. This eliminated the need to manually search all student files and presented a high probability of yielding an appropriate sample.

Two additional students from Holy Cross and E. D. Feehan Collegiates in Saskatoon, Saskatchewan, were added to the five Edmonton subjects when the researcher relocated following initial data analysis. These seven students formed the present study sample. The Saskatoon subjects were selected through the cooperation of the resource teacher at the aforementioned schools.

The two Saskatoon subjects were chosen according to the same criteria as the initial five, but the parameters were refocused in order to expand the opportunities to observe students with characteristics either present in only one Edmonton subject or not

represented in the five previously selected subjects. For example, while four of the five Edmonton subjects exhibited problems in reading or in reading and math, only one subject had good reading skills but severe deficits in math achievement. An attempt was made to locate another student whose general academic profile would be similar to that of the strong reader/poor math skills subject.

The second variant criteria was based on the need to include a child with cultural difference in the study. Since the study was exploratory in nature, the researcher felt a representative case of a native student who met all screening requirements but that of socioeconomic status would be valuable. While one of the students in the Edmonton group was not Canadian and was of a different racial background, he had been born in England and had lived only in English speaking countries. He also came from a family of a socioeconomic status well within the criterion established for the present study.

The student chosen because of cultural difference was a young man of Metis descent whose socioeconomic status was very low. He met all other criteria designated by the study.

Selection of a student who read well but had severe difficulty in Math proved to be surprisingly difficult. The writer expanded her search beyond those students receiving resource help to those who were in the general math programs in the two Saskatoon schools. Hundreds of files were examined before a likely candidate emerged. The "good reader but poor in Math" image of that candidate prevailed through the screening but, in individual testing, the subject's reading skills as measured by the Woodcock Reading Mastery Tests were

too low for him to be considered a good reader. He was included in the study as his profile, except for not being seen in the resource room, was similar to the other subjects and he met all the screening criteria of the present study.

INITIAL SCREENING

Subjects were chosen according to the following criteria:

Freedom from general exclusionary conditions. Evidence of physical, sensory or emotional handicap which might have been the primary reason for academic difficulty was examined. Investigations into written records led the researcher to believe that the pilot group was free from any such problems. However, parental interviews following the data analysis revealed that there was some concern regarding possible central nervous system damage in one student. The difficulty, apparent at birth, was not mentioned in the school records.

Relatively high socioeconomic status. It was believed, if subjects were selected from families falling into ratings in the first three classes on the Blischen scale, that the likelihood of choosing a student whose underachievement was due to limited environmental experience would be greatly reduced. In cases where the student was part of a family setting where there was a single female parent, or where remarriage of the mother had occurred and records on the new father's work were incomplete, the mother's occupation rather than the father's type of work was rated. The student chosen specifically because of cultural differences lived in

poverty and, therefore, did not meet the high SES criteria.

Average to above average intellectual ability. Not all students had been given individual intelligence tests in the past. In previous testing, group tests such as the Large Thorndike or the Canadian Cognitive Abilities Tests had been the only measure used with some students. Other subjects had been tested with the Weschler Intelligence Scale for Children - Revised (WISC-R) but the results varied from having been obtained within the year to being as much as eight years old in some cases. Students whose Verbal or Performance IQs fell in the average (90 to 109) to high average (110 to 119) ranges on the various instruments were selected.

History of difficulty in academic programs. Students' records were examined for information regarding low or failing grades, referrals for specialized testing, and teacher comments of concern about student progress. Care was taken to select students in whose files documented difficulty had been evidenced throughout their school careers rather than students who seemed to experience problems only after they had entered high school.

Present difficulty with academic programs. As the student population from which the sample was being drawn was one in which tutorial help was being or had been received, it was important to substantiate the continuance of academic problems. The students selected had all experienced some failure in the school term. The percentage of courses being failed ranged from 22 to 67 percent with students having averages ranging from 46% to 72% (see Table 1). The student having the greatest difficulty in school was the only subject

Table 1

School Performance of all Subjects

Subject	Age	Grade	Number of Subjects Taken	Number of Academic Subjects	Most Recent Average %	Lowest Mark (Subject) %	Highest Mark (Subject) %	Number & %age of Subjects Failed
A	16y 1m	10	8	5	49	15 (English and Social Studies)	70 (Art)	2 (25%)
B	16y 5m	11	7	4	56	33 (Psychology)	75 (Building Construction)	3 (44%)
C	17y 0m	11	9	7	46	32 (Accounting)	66 (Graphic Communications)	2 (22%)
D	15y 4m	10	7	4	55	39 (Materials)	68 (Math)	2 (29%)
E	19y 1m	11	4	1	67	35 (English)	93 (Facts of Life)	1 (25%)
Δ F	18y 10m	11	*4 [4]	3 [3]	72 [53]	65 (Biology)	77 (General Math)	0 (0%) [1 (25%)]
G	15y 11m	10	6	5	47	28 (Science)	70 (Physical Education)	4 (67%)

Abbreviations: y = year
m = month(s)
% = percent
%age = percentage

*no mark assigned for resource room
Δsquare bracketed information is from the previous report period of the same semester

Note: Information on Subjects A-E was based on the April 1983 assessment.
Subject F was tested in March and May of 1984; Subject G in April of 1984.

who was taking all academic courses and the only student who was not receiving resource room help.

Specific difficulty in either reading or mathematics as indicated by standardized testing. Standardized testing in mathematics was not conducted beyond the sixth grade level in the Edmonton Public School System and was not done routinely in Saskatoon; therefore, the researcher turned to reading scores for standardized information.

Edmonton students who met the criteria as previously outlined and who obtained the six lowest scores of all the subjects screened on the Davis Reading Test were originally included in the pilot study. The Davis is a group test which is designed on a multiple choice format and which is given to all ninth graders in the Edmonton Public School System. Although the Davis yields percentile performance scores for both reading level and reading speed, the level scores were the ones considered in the selection of subjects. On this measure five of the six students had scores falling below the 15th percentile while the sixth had a reading level score at the 29th percentile. Although Davis results were helpful in distinguishing poor readers in this initial stage of the study, they were at best rough estimates of the students' abilities.

In the Saskatoon Catholic School System the standardized tests used routinely at the elementary level are the Canadian Tests of Basic Skills. No periodic standardized group testing was done at the high school level. However, both Saskatoon subjects had been seen routinely over the years for individual assessments. Very recent individualized standardized results in the form of Woodcock Reading

Mastery Tests (Woodcock) and Wide Range Achievement Test (WRAT) Arithmetic subtest scores were available for the culturally disadvantaged student. The student with Math difficulty had not received an individual assessment for four years and so he was given the WRAT Reading and Arithmetic subtests once it was clear that he had met all the other criteria. The resultant fifty-four point split in percentile scores between the two subtests in favour of Reading was the largest discrepancy which could be found through the extensive screening process for a second Math-disabled student. It did not, however, approximate the ninety-two point split in the other subject with good reading and poor math skills

FURTHER SCREENING

The subjects selected in the initial screening procedure were required to pass four additional screening steps: an interview, an assessment of organizational ability, individualized intelligence testing, and individualized achievement testing.

Interview. Individual interviews were held with each student, outlining the purposes of the study. It was explained that the tests and tasks involved were not directly involved with the students' programs and that they would be working as volunteers. All seven seemed eager to take part.

Assessment of Organizational Ability. The intent of the present study was to investigate the strategies used by students who might not only be called inefficient learners but who were identified as having organizational problems by their teachers. The identification

procedure centered on the completion of a twenty-point questionnaire. Questionnaires were completed by two of each student's teachers. In three cases one of the teachers was the Learning Assistance or Resource Room teacher while in the remaining instances classroom teachers filled out both forms.

The questionnaire was made up of two parts. Part A covered general organizational ability and five aspects of organizing conscious activity: planning, inspection, regulation, verification and correction. Teachers were asked to read a statement and indicate if they saw the behaviour described in the statement always, usually, sometimes or never. They were also given the opportunity to check a "don't know" column if they were unsure of how the student would behave in a given situation. Teachers were cautioned to respond to the student's organizational ability rather than to his academic ability. They were also asked to respond in a reflection of ongoing student behaviour and not just to utilize the questionnaire as a checklist for a single observational period. Appendix B contains a sample of the questionnaire and the accompanying letter given to teachers.

Part B of the questionnaire gave the teachers the opportunity of stating whether, in their opinions, the student was organized or disorganized and to add written comments of their choosing. This section of the questionnaire also allowed the teacher to indicate the subject area in which the student was being instructed.

Questionnaires were analyzed in a number of ways including: teacher classification, global numerical rating, and ratings on six

aspects of the organization of behaviour. In terms of teacher classification, three of the seven students received one organized and one disorganized rating; three students were rated as disorganized by both their teachers while another received two organized ratings. Numerical ratings on the questionnaire were obtained by awarding scores from 4 to 0 on the five ratings previously discussed. The range of global scores out of a possible 80 was 18 to 69. Scores in the fifty and sixty range were clearly rated as organized by the teachers while scores in the 30 range and below were always rated as disorganized. Ratings in the 40 range were rated as disorganized in all but one instance, that of Subject C's ratings (see Table 2). Since his numerical rating was in the

Table 2
Organizational Classifications and Numerical Ratings by Subjects' Teachers

Subject	Academic Setting		Less Academic Setting	
	Classification	Rating	Classification	Rating
A	Disorganized	18	*Disorganized	*34
B	Disorganized	34	Organized	69
C	Organized	40	Organized	69
D	Disorganized	34	Organized	*47
E	Disorganized	43	*Organized	52
F	Disorganized	40	*Disorganized	*40
G	Disorganized	41	n/a	n/a
	Disorganized	25		
\bar{X}		36.63		51.83

*Rating by learning Assistance Teacher

40's he was included in the study despite two verbal classifications of "organized".

Ratings on the six aspects of organizational behaviour as completed by two raters per student did not yield similar patterns. It must be stressed that all but one student was rated in each of both an academic setting and a nonacademic or tutorial setting. Student G took only academic subjects and received no tutorial help, therefore he was rated in two academic settings. Six of the eight academic settings were English classes while two were Mathematics courses. The remaining classes were Woodworking, Industrial Arts, Facts of Life and Learning Assistance. Invariably, students were rated more highly in the less academic setting. In Table 2, the first classification and rating columns represent the academic settings while the two last columns show the summary information from questionnaires filled out by teachers in less academic settings. Table 3 outlines the organizational steps which were rated most highly and those considered to be least effectively carried out.

Teachers who taught the subjects in more academic settings tended to classify them as disorganized rather than as organized (see Table 2) and also saw them as engaging less often in specifically described organizational behaviours. This less frequent behaviour was reflected in a lower global numeral rating (see Table 2). When responses to the randomized items were clustered into six categories: general organization, planning, inspection, regulation and correction, a pattern emerged in the responses of the "academic" teachers. Without exception, they rated students most highly on

their general organizational ability (see Table 3). Three of the seven subjects were seen utilizing inspection less frequently than any other skill in academic settings (see Table 3). Teachers in less academically oriented programs tended to see the students as organized and as engaging more often in specifically described organizational behaviours (see Table 2). No general pattern emerged in the results of the behaviour most highly rated in the less academic settings; however, four of the seven students were rated most highly in general organization ability. Six of the seven students received their lowest ratings or one of their lowest ratings in their ability to verify (see Table 3).

Individual Intelligence Testing. Those students not having been tested with a WISC-R or a Weschler Adult Intelligence Scale - Revised (WAIS-R) in the twelve-month period preceding the present pilot study were given an individualized assessment with the most appropriate instrument. Four of the seven subjects required such testing. Letters were sent to the parents of all seven subjects requesting permission to test and informing them of the purposes of the study (see Appendix A). Results of the intellectual assessment substantiated the previously available information that all the subjects had a measured Verbal or Performance IQ in the average to above average range. Table 4 summarizes the findings of the intellectual measures.

Individual Standardized Testing in Reading and Arithmetic. In order to have more updated and specific information about the degree of disability in the students' reading and basic math skills, further

Table 3

Highest and Lowest Ratings on the Five Aspects of Organizing
Conscious Behaviour and General Organizational Ability as Represented
by Teacher Responses to a Questionnaire

Subject	Academic High Rating	Less Academic High Rating	Academic Low Rating	Less Academic Low Rating
A	General Org.	General Org.	Planning Inspection	Verification
B	General Org.	Inspection	Correction	General Org. Verification Correction
C	General Org.	General Org. Inspection	Inspection Correction	Verification
D	General Org.	Planning	Inspection	Correcton
E	General Org.	Correction	Regulation	Verification
F	General Org.	General Org.	Correction	Inspection
G	General Org. General Org.		Verification Verification	

Note: Both of Subject G's ratings occurred in academic settings.

Abbreviations: Org. = Organization

testing was conducted. The Arithmetic subtest (Level 11) of the WRAT and three subtests, Word Identification, Word Attack and Passage Comprehension of the Woodcock Reading Mastery Tests Form A, were administered. The WRAT manual reports split-half reliabilities for each subtest by grade level. All reliabilities exceed .90 (Salvia and Ysseldyke, 1978). Since the Arithmetic subtest measures only

computational skills, it does not assess the content of the curriculum, bringing into question the content validity. However, the test can be used to obtain a global picture of achievement (Salvia and Ysseldyke, 1978). Reliability of the Woodcock Reading Mastery Tests is questionable for some subtests, especially at older grade levels, while validity is acceptable (Bunch and Robertson, 1983). More specifically, the subtests used in the present study have been reported to have relatively high split-half reliabilities, all

Table 4

Verbal, Performance and Full Scale intelligence Quotients for the Seven Subjects

exceeding .93 (Salvia and Ysseldyke, 1978).

Percentile scores from the Woodcock passage comprehension subtest and the WRAT Arithmetic subtest may be found in Table 5. Those with scores falling below the 40th percentile on the Woodcock passage Comprehension subtest were considered to have a reading problem while

Table 5
Percentile Scores on Individualized Achievement Tests

Subject	Woodcock Passage Comprehension	WRAT Arithmetic Subtest (untimed)
# A	55	23
+ B	28	81
+ C	37	47
o D	7	30
o E	1	7
o F	38	66
o G	38	21

Code: # = math problem
 + = reading problem
 o = math and reading problem

those having a percentile score of 35 or below on the WRAT Arithmetic subtest were labelled as having difficulty in mathematics. These cut-off points were arrived at arbitrarily. One subject had scores lower than the cut-off point only in Arithmetic; two had problems in Reading Comprehension but not in Mathematics; and four others had difficulty in both subject areas.

SAMPLE

The study was made up of seven male adolescents who were experiencing academic difficulty and who were identified by at least one of their teachers as being disorganized. Academic difficulty was defined as presently failing at least one school subject in the present or just previous reporting period and having a history of achievement problems. Teacher nomination of disorganized behaviour was accompanied by the completion of a questionnaire by the same teacher so a substantiating numerical rating could be obtained. Six of the subjects were required to come from a family whose income could be classified as falling into the first three levels of the Blischen Scale. The final subject (Subject F) was purposely chosen because of cultural difference and lived in poverty.

The students had no recorded problems of a physical, sensory or emotional nature and were of average to above average intelligence. The mean age of the group was 17 years 1 month (range 15 years 4 months to 19 years 1 month), with a mean Full Scale IQ of 103.8 (range 92 to 110), a mean Verbal IQ of 101.1 (range 86 to 112), and a mean Performance IQ of 103.8 (range 87 to 115), as measured on the WAIS-R and WISC-R.

INFORMATION REGARDING ACHIEVEMENT AND PROCESSING SKILLS

Although the number of subjects was small, steps were taken to measure and record information regarding the patterns of skills possessed by each student. Such data allowed the researcher to

compare the type of strategy use with underlying achievement and processing strengths and weaknesses. Instruments used included those which had been utilized in the detailed screening procedures of the present study: the WRAT Arithmetic subtest, Level 11, and the Passage Comprehension subtest of the Woodcock Reading Mastery Tests. Subtest information from the Weschler Intelligence tests was also part of the information gathered. This was later updated if it was more than a year old. In addition, the Specific Language Disability Test (Malcomesius) was used to obtain measures of visual and auditory processing. These measures included assessment of far copying, near copying, visual discrimination, visual memory (recognition), visual memory (reproduction), auditory discrimination, auditory memory to motor and auditory to visual (recognition). As well, three subtests of the Detroit Tests of Learning Aptitude were given: Verbal Absurdities, Auditory Attention Span for Unrelated Words and Auditory Attention Span for Related Syllables. The Word Identification and Word Analysis subtests of the Woodcock Reading Mastery Tests were administered during the screening procedures but were purposed to serve as vehicles to gain additional information regarding skill development. To gain some knowledge of facility in language, two subtests of the Clinical Evaluation of Language Function (CELF), Processing Relationships and Ambiguities and Producing Formulated Sentences, as well as the Divergent Production, Syllabication and Grammatic Competency subtests of the Fullerton Language Tests for Adolescents were administered. A detailed account of assessment results may be found in Tables 6, 7 and 8. Informal measures of

descriptive oral and written language were also included in the battery.

Table 6
Achievement Test Scores

Subject	<u>Woodcock</u>			<u>WRAT</u>
	<u>WID</u>	<u>WA</u> %iles	<u>PC</u>	<u>Math</u> untimed %iles
A	88	84	55	23
B	45	74	28	81
C	36	44	37	47
D	30	30	7	30
E	1	16	1	7
F	9	7	38	66
G	64	85	37	21

Abbreviations: WID = Word Identification
 WA = Word Analysis
 PC = Passage Comprehension

TASKS

It was the intention of the researcher to utilize a series of tasks which would provide the opportunity to observe the individualized task approach of each subject. Three tasks were chosen to gain information about the subjects' use of strategy. They were the Rods Task, the Test Search Task and the Errand Planning Task. These tasks have been described in detail in the text to follow. Each task made its own unique contribution to the battery.

Table 7

Processing Test Scores

Malcomesius													Detroit		WISC-R or WAIS-R	
Glances				Errors*												
FC NC				FC	NC	VD	VM1	VM2	AD	AM	AV	%Un Words		Rel Syl	Digit Span	
Raw Scores				Raw Scores								Age Scores		Scaled Scores		
A	13	22		1	1	0	1	1	2	1	1	8y 8m	8y 0m	11		
B	37	7*		1	0	0	0	2	1	4	0	8y 10m	9y 9m	10		
C	36	39		0	0	1	0	4	0	6	1	7y 0m	10y 3m	6		
D	29	34		6	1	0	2	1	2	10	1	8y 6m	10y 0m	6		
E	87	68		0	0	1	2	14	1	19	1	10y 8m	13y 9m	-		
F	40	27		2	0	0	1	2	0	7	0	8y 6m	12y 3m	6		
G	10	18		0	0	0	0	2	1	1	0	9y 9m	8y 0m	8		

*This score is misleading as Subject B tended to keep his eye on the model while writing rather than looking back and forth.

°The age scores for the Unrelated Words subtest represent mean scores based on the simple and weighted age scores.

Abbreviations:

- FC: Far Copying
- NC: Near Copying
- VD: Visual Discrimination
- VM1: Visual Memory Recognition
- VM2: Visual Memory Reproduction
- AD: Auditory Discrimination
- AM: Auditory to Motor
- AV: Auditory to Visual
- Un Words: Auditory Attention Span for Unrelated Words
- Rel Syl: Auditory Attention Span for Related Syllables

Table 8

Language Test Results

Subject	Tests					
	Detroit	Celf		Fullerton		
	VA	R&A	FormSen	DivProd	Syll	GramCom
	Age Scores	Raw Scores		Raw Scores		
A	10y 6m	60(A)	50(A)	33(2+B)	16(at)	18(A)
B	14y 3m	55(A)	59(A)	62(at)	16(at)	19(1A)
C	15y 0m	56(A)	38(B)	37(1+B)	16(at)	19(1A)
D	15y 6m	49(at)	23(B)	55(B)	10(2B)	16(B)
E	14y 0m	57(A)	49(A)	42(1+B)	12(1+B)	19(1A)
F	14y 0m	46(B)	53(A)	51(B)	12(1+B)	15(1B)
G	13y 0m	58(A)	43(A)	52(B)	8(2+B)	18(A)

Abbreviations: VA = Verbal Absurdities
 R&A = Relationships and Ambiguities
 FormSen = Formulated Sentences
 DivProd = Divergent Production
 Syll = Syllabication
 GramCom = Grammatic Competency
 y = years
 m = months
 %ile = percentile
 at = at criterion or at mean
 A = above criterion or mean
 B = below criterion or mean
 1 = 1 standard deviation
 2 = 2 standard deviations
 + = more than

The Rods Task had the capacity to disclose whether the student did or did not use a clearly defined cognitive strategy which according to Stone (1980) might be expected in the majority of adolescents by their fourteenth year. The Text Search Task was a school-related task, which subjects would be required to use frequently in finding information in their textbooks. Finally, the Errand Planning Task tapped the students' social planning skills and included temporal and spatial constraints.

A fourth task, the Self-Ordered Task, was a neuropsychological task which was known to be sensitive to frontal lobe dysfunction in patients with frontal lobe lesions. It was administered to ascertain if there would be any indication of poor performance in students whose characteristics in general task approach and daily living resembled those of some frontal lobe patients.

The first three tasks were presented with similar formats. That is, they were initiated by open-ended questioning which set the goal or gave the intention of the task; they included the opportunity for the researcher to elicit strategies not used spontaneously; they afforded the opportunity for the student to approach the task a second time after he had experienced the elicitation step; and they did not contain corrective or teaching components. The fourth task was also based on an established goal, yet the achievement of that goal was left up to the student. All tasks involved a type of thinking aloud procedure which permitted the study of transcription protocols. As well, each task involved a manipulative component so that overt behaviour could be video taped and analyzed.

Each task used in the present study was based on a specific standard presentation in which each subject was initially given the same information in the same manner. The same standardized procedure was utilized as the subject moved through various stages of each task. However, in all but the Self-Ordered Task, which adhered to a standardized format throughout, there were interactive elements in the tasks as well. In a sense the researcher became somewhat of a participant observer as the subjects moved through the experiments, questioning her and verbalizing their behaviours as they progressed. One might say that the tasks themselves were standardized while the interactions around them were fairly open. There were, however, restrictions on how much guidance and/or information the researcher would offer. Her verbalizations were primarily repetitions, rephrasings and probings.

Rods Task

Description

Formulated by Inhelder and Piaget (1958), the Rods Task has been used by Stone and Day (1978, 1980), Stone (1980), and Day and Stone (1982) in a number of studies in which the cognitive processing of adolescents was examined. In general, the task involves determining the factors which govern the relative flexibility of a set of rods. These factors have included length, material, diameter, base, amount of weight used to bend the rods, and the positions where weights may be added to the rods. The number of variables utilized change from study to study in Stone's work. The student is shown an array of

ten or twelve rods which vary along some of the dimensions just described. (See Appendix C for specifications for the two sets of twelve rods used in the present study.) He is also provided with weights which he will hang on the rods. As well as the materials previously mentioned, the student has a stand into which the rods are placed two or four at a time as weights are hung on them (see Figure 1).

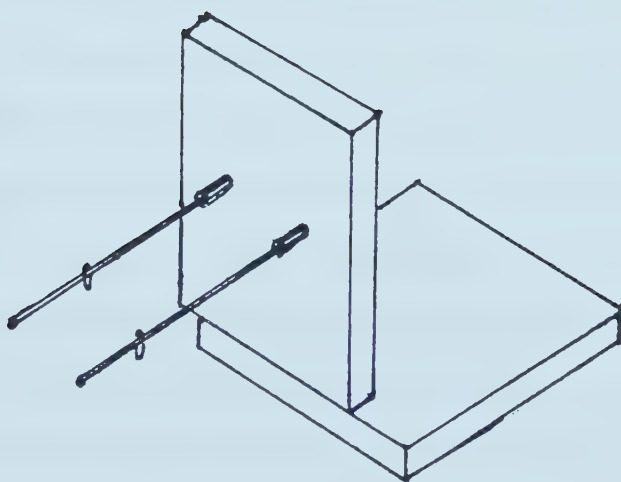


Figure 1: Rods Apparatus

The subject's task is to do whatever tests he needs to do in order to figure out "what makes a difference for bending." Task performance is evaluated on the basis of whether he holds all other variables constant while testing one variable (an unconfounded test) or whether he tests one variable without controlling for other variables (a confounded test). An example of a confounded test of length would be use of a pair of rods which were not only of different lengths but also of different materials or diameters or on which differing weights were placed. In an unconfounded test of length, the rods of varying length would be the same material, the same diameter, and equal weights placed in equivalent positions would be used to judge the degree of bending which would take place.

As mentioned, the studies which have been referenced as the model for the Rods Task have been varied. The 1980 work of Stone and the 1982 study by Day and Stone utilized the variables of length, diameter, material and place of weight attachment. In both these studies a subject who was using the control-of-variables strategy was identified as one who made unconfounded tests of three of the four variables. In his more recent work (see Appendix D) Stone (1983) has incorporated a fixed weight position by attaching a clip to the end of the rod. This fixed position eliminated the position variable. However, varying weights were added as a fourth variable. The subject is provided with two pairs of weights: one pair weighing one ounce each and a second pair weighing two ounces each. A fifth dimension was also added in Stone's later work in the form of a "red-herring" variable. Stone utilized bases of different materials.

While these bases did not make a difference for bending, they did provide the opportunity for demonstration of a confounded or unconfounded test.

In the present study, six variables were used: length, diameter, material base, and weights were employed and as well, students were permitted to hang the weights wherever they chose on their rods: thus position of weight was also a consideration. This last variable, however, was not demonstrated during the elicitation phases of the task.

The Rods Task began by allowing the subject a free performance trial during which he experimented with the rods. Following this display of uncoached strategy, a series of demonstrations occurred. While no teaching took place, the subject was requested to judge between good and poor attempts to test specific variables. This was an elicitation step and no feedback was given. After the attempt to elicit strategy, the student was once again placed in a free performance situation to see if he had learned from the demonstrations. From this approach, it was possible to see if the subject used a previously defined strategy spontaneously, if he could elicit the strategy from making a series of judgments, or if he failed to use the strategy and fell into the strategy absent classification. In the present study a control-of-variables strategy consisted of making unconfounded tests in four of the six variables. The subject was also required to have named the unconfounded variable he was testing.

There are a number of factors which make the approach to the Rods

Task used in the present study variant from that used in Stone's work. The first is the lack of fixed positioning of the weights and the second is in the elimination of some of the more direct guidance. Thirdly, subjects in the present study were given the opportunity to do a final independent test at the conclusion of the experiment. Finally, summative metacognitive questions were included in the present study.

In their earlier work, Stone (1980) and Day and Stone (1982) used three places of weight attachment; at $1/3$, $2/3$ and $3/3$ of the length of each rod. In his later work, Stone (1983) used only one place of attachment, namely at the end of each rod. This latter procedure follows the method used by Inhelder and Piaget (1958). The free positioning possible in the present study resembles more the choices in the three position variation of the Rods Task than it does the fixed-end position. It requires the student to take into consideration where the weights are placed in drawing conclusions about what matters for bending.

In most cases, the free placement did not interfere with interpretation of the task as the subjects tended to slide the weights on the rods, thus observing when the longer or thinner rods began to bend more. Many subjects utilized the tips of the rods in making their tests choosing a fixed position. Even when they "set" the weights on the rods so that the weights were parallel to one another, it was still evident in most cases which rod bent the most. However, difficulty arose in the comparison of the 60 cm and 20 cm rods of the widest diameter. In such a test a parallel placement of

the weights with one weight at the end of the twenty centimeter rod could confuse a student in the early stages of the experimentation as the rods bent equally in what otherwise could have been an unconfounded test of length. This same scenario could occur in the three positioning variation used by Stone, but in that case the student might be more likely to notice the position variable because of the fixed attachment.

In the present study, the writer is reasonably sure that the free positioning of weights caused confusion for only one subject: Subject C, on one test. In this case it was a crucial test. Others incorporated questionable positioning on tests which were confounded by other variables and did not seem confused by the positioning.

The second way in which the present study varied from Stone's work was in the elimination of a directive element in the elicitation phase of the Free Performance Task. In this phase in the Stone procedure, (C. A. Stone, personal communication, June, 1983), the examiner asked the subject if he had finished showing what mattered for bending. If the subject was finished, the examiner reminded the subject of a variable which the subject had mentioned at the onset of the experiment in answer to a question from the examiner: "So now you can see that some rods bend more than others. What I want you to do is figure out why. You may have some ideas already, do you?" (Bending Rods Task Instructions, Stone, 1983). The subject was asked to: "Show me that with a set of rods," and then: "Show me that with another set of rods," if the subject had not made consistently confounded or unconfounded tests of that dimension.

Following tests of these previously mentioned variables the examiner would give the subject an idea of how many variables he had not mentioned and give him the opportunity to contribute suggestions. Repeated tests were elicited in the manner used previously. Finally, any dimension not identified by the subject spontaneously or in response to the queries was named by the experimenter and the subject was asked to show how that dimension influenced bending. Further tests were requested if the subject had not made consistently confounded or unconfounded tests of that dimension (C. A. Stone, personal communication, June, 1983).

In the present study, once the subject felt he was finished testing, the examiner went on to the elicitation phase of Pairs Choice or Final Choice. He was given no indication of how many variables he had missed nor were those variables he could not name given to him. He was not reminded of dimensions that he had mentioned but not tested. In short, no elicitation or teaching took place in the Free Performance Trials; it was restricted entirely to the two elicitation phases.

An additional stage of the present study, not part of Stone's work, was a final chance to see if any further elicitation had occurred through the Final Choice phase. This was an independent test where the subject was asked to demonstrate a choice of rods which was a good test of any variable he chose. This stage required the subject to choose rods according to a dimension he had selected. In essence it was a culmination step. Interestingly, four of the subjects were able to construct unconfounded tests at this stage of

the experiment. However, since they were only given the opportunity to test one variable, there is no evidence that the control-of-variables strategy had been elicited.

The metacognitive phase of the present study which extended beyond the Stone studies was one in which the subject was asked to compare the state of his knowledge prior to and following the experiment and to speculate as to what he had learned. Appendix E shows a summary of those responses.

Text Search Task

Readability

This task consisted of asking the student to find an answer to a specific question by looking in a well-organized text. The student was required to determine where in the text the answer should be found and to read to locate that answer. Rather than using one text, two texts were selected from a single series. The Rix Readability Formula (Anderson, 1983) was employed to ensure that a given book was appropriate for a particular subject. Table 9 contains a descriptor of the Rix formula. Table 10 gives the results of using the Rix formula on the Heath Science series.

Choosing Appropriate Materials

The Heath series was chosen because the books contained a number of features of external organization such as a Table of Contents, Index/Glossary, clear headings and boldly printed key words. The books were also attractive. The pictures and diagrams were not demeaning to an adolescent. In the examiner's opinion there was

Table 9

The Rix Formula

Rix: A Simpler version of Lix
for estimating reading difficulty
of English Tests by grade level

Directions:

- 1. Select a sample of sentences from the book to be analyzed. The number of samples depends in part on the size of the book and in part on the consistency of writing. As a guide: for short texts, 10 samples of 10 sentences each, taken regularly through the book, may be sufficient; for longer works, samples of at least twice this size will probably be required. Very short texts may be analyzed in their entirety.
- 2. For each total sample (excluding headings, captions, etc.):
 - (a) Count the number of sentences.
A sentence is defined as a sequence of words terminated by a full-stop (period), question or exclamation mark, colon or semicolon. However, in direct speech, sequences like "Where?" he asked, and "Go!" he ordered, count as single sentences.
 - (b) Count the number of long words (i.e. words of 7 or more characters after excluding hyphens, punctuation marks and brackets).
A word is defined as a sequence of characters bounded by white spaces. Thus numbers like 1.461 and 10.1, hyphenated sequences, abbreviations, (e.g., IRA, a.m.), dates such as (1981-1982), and symbols like % count as single words.
- 3. Determine Rix by dividing the number of long words by the number of sentences (work to 2 decimal points).

Interpretation	Rix Score	Equivalent grade level
To find the equivalent grade level of difficulty for Rix, locate the Rix score in the lefthand column and the corresponding grade in the righthand column.	7.1 and above	College
	6.2 and above	12
	5.3 and above	11
	4.5 and above	10
	3.7 and above	9
	3.0 and above	8
	2.4 and above	7
	1.8 and above	6
	1.3 and above	5
	0.8 and above	4
	0.5 and above	3
	0.2 and above	2
	Below 0.2	1

nothing inherent in the appearance of the text to detract from the task at hand. Finding books at the lower levels of readability which utilized indices was very difficult. Although the combined index/glossary in the Heath series was initially confusing to some students, it did not interfere with the purpose of the task.

Table 10
Comparison of Grade Labels and Readability Levels of Selected Heath Science Texts

Heath Science	Rix Readability Level
*Grade 3	Grade 4
Grade 4	Grade 5
Grade 5	Grade 5
*Grade 6	Grade 4

*selected for use in the study

It was hoped that each subject could be given a book which was approximately one grade level below his Easy Reading Level as measured by the Woodcock Reading Mastery Tests, Form A. (Table 11 outlines the results of the Passage Comprehension subtest of the Woodcock.) However, problems arose with two of the seven subjects in attempting to meet the aforementioned criteria. Subject D's easy reading level was 3.7 and no Grade Two material was available in the Heath Series. Some of the other Grade Two texts investigated were above the Grade Two readability level while none contained an index. Subject D was therefore asked to read a passage aloud from the Grade

Table 11

Woodcock Passage Comprehension Reading Levels

Subject	Easy	Grade	Failure
A	8.4	12.2	12.9
B	6.2	8.4	12.9
C	6.9	9.5	12.9
D	3.7	4.9	6.4
E	4.7	6.2	8.4
F	7.2	9.9	12.9
G	6.7	9.2	12.9
\bar{X}	6.3	8.6	11.2

Three Heath Science text. He read fluently and with understanding. He also had no difficulty with the text in the task itself.

Subject A's Easy Reading level was four grade levels above the readability level of the text used. However, although he had no difficulty with reading the book, he was unable to cope with the task. A comparison of Easy Reading Grade Level scores on the Woodcock and Heath Science Texts is found in Table 12.

Description

Students were assured that the task they were about to begin was "more a matter of finding things than of reading." They were also told that the book would be easy for them to read.

Table 12

Text Placement and Readability Compared to Easy Reading Level on the Woodcock

Subject	Woodcock Easy Reading Level	Heath Science Text Used	Rix Readability
A	8.4	Grade 6	Grade 4
B	6.2	Grade 6	Grade 4
C	6.9	Grade 6	Grade 4
D	3.7	Grade 3	Grade 4
E	4.7	Grade 3	Grade 4
F	7.2	Grade 6	Grade 4
G	6.7	Grade 6	Grade 4

The session was divided into three parts. The first part consisted of an introduction of the materials, a demonstration of the principal features of the text (without describing their use) and an open-ended instruction to "find the answer to this question." The second part of the Text Search Task consisted of two three-part demonstrations of text utilization in order to find an answer to a question. Basically, the first method was a random "flipping" technique (Type 1 strategy); the second, a use of the table of contents followed by paging through a chapter (Type 2 strategy); while the last method used the index for more precise location of the topic (Type 3 strategy). The student was asked to judge the best of the three demonstrations and to justify his choices. No feedback was

provided. This second part was an attempt to elicit skills not displayed spontaneously. The third part of the sessions consisted of a repetition of part one. Samples of the types of questions may be found in Appendix F while Appendix G contains the detailed guide for presenting the task.

Errand Planning Task

The basic theory upon which the Errand Planning Task was based is presented in the work of Hayes-Roth and Hayes-Roth (1979), Hayes-Roth (1980), and Goldin and Hayes-Roth (1980) as they have investigated individual differences in planning a day's errands. The task was modified to conform to the Trial One - Elicitation - Trial Two Model used in the previous tasks.

Description

A series of hypothetical errands to be done in a single day were presented to each student. The subject was asked to formulate a realistic plan indicating which errands would be done, when they would be done, and the method of travel among them. The subject was presented with both verbal and written scenarios describing the errands and some of the time constraints. As well, a two-dimensional map was given to students. On the map, streets were depicted by electrical tape, buildings by magazine photographs, bus routes by coloured strips on the road surface, and bus stops by a card bearing the letter B. The student's task was to decide which of the errands he could do, the times he could do them, and how he could get around--would he walk or take a bus for example. His performance was

judged on the way he sequenced the events into the time frame. See Figure 2 for the map outline.

The scenario was as follows:

It is 1:30 p.m. and you have just finished a class. Your next period is a spare so you are free to leave the school or spend the time studying. You have an exam in your first period tomorrow morning and you need to study for at least two hours. You have a dental appointment at 4:30 which you cannot miss but you know that your dentist seldom keeps you waiting and that you should be out by 5:15. Tonight a friend and his (her) parents are giving a party for another friend who is moving to Calgary. Most people are arriving at 7:30 but food will not be served until 8:30. You want to be asleep between 10:30 and 11:00 so that you are not too tired for your exam. Your other errands are as follows:

- pick up potato chips for the party
- buy a record as a present for your friend
- return a book to the library
- meet a friend for a quick hamburger so you will last until 8:30
- go home and get ready for the party
- take your dog for a run
- watch your favourite T.V. show at seven
- take your bike to the repair shop
- take some baking to your grandparents' home

The session was divided into three parts. The first part consisted of an introduction of the materials, demonstration of the use of the map, and an open-ended instruction as indicated earlier. The second part of the Errand Task consisted of a series of questions in which the student was to judge the better of two plans, one of the alternatives being well planned (showing the clustering of events in an efficient manner) and the other being poorly planned (showing inefficient use of time and space). The student was asked to justify

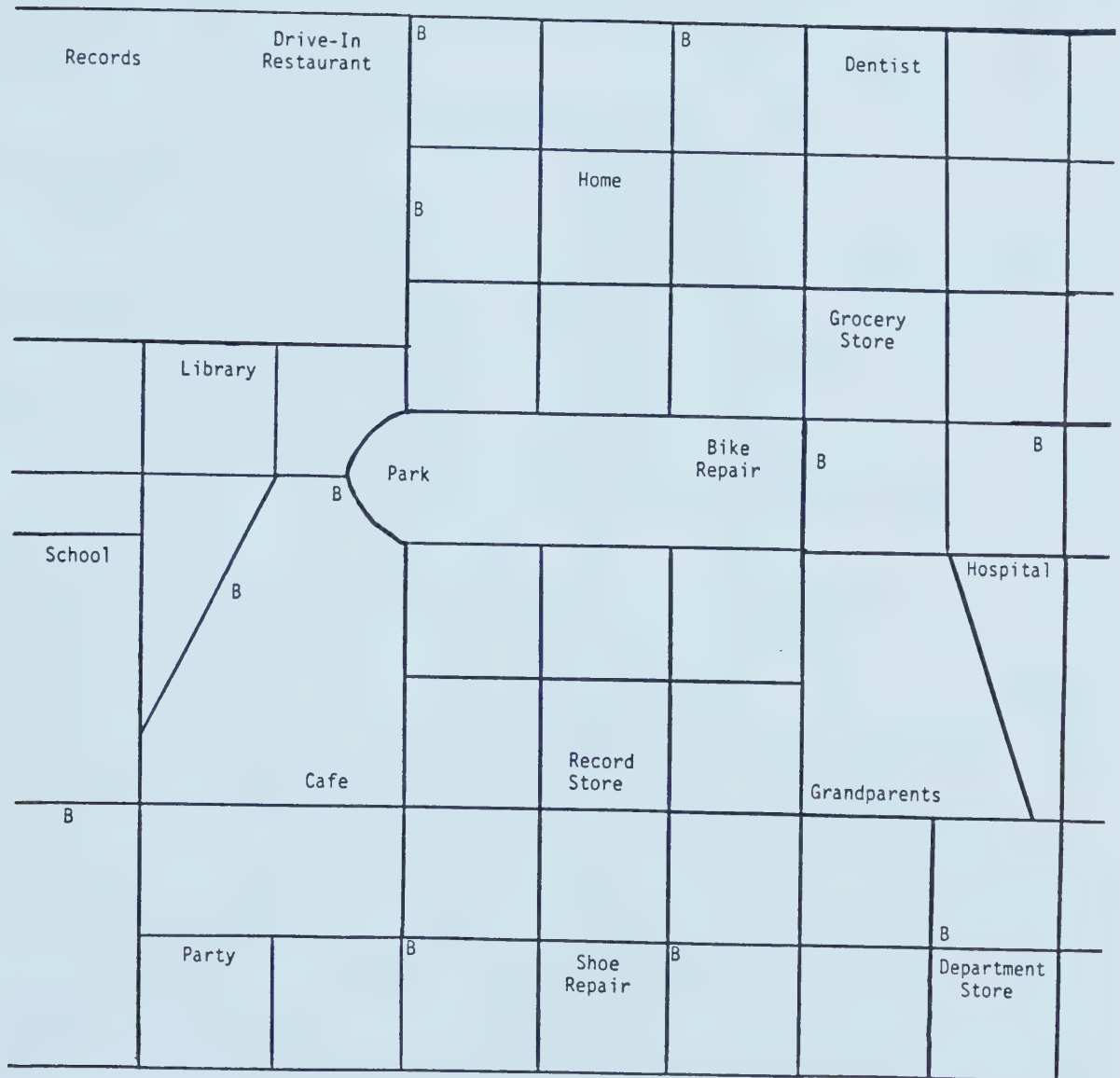


Figure 2: Map outline used in the Errand Planning Task

his choices but no feedback was provided. The third part of the session consisted of a repetition of part one. A detailed explanation of the task may be found in Appendix H.

Self-Ordered Task

Description

The Self-Ordered Task used in the present study was designed by Petrides and Milner (1982). The task required the subject to organize and to carry out a sequence of responses. The stimulus material consisted of abstract designs which had been devised so that they were not difficult to distinguish visually but rather hard to code verbally. The task itself was subdivided into sections consisting of pages containing sets of six, eight, ten and twelve items. No item was used in more than one set. That is, drawings used in the formats of six items were not found in any of the other set formats. Three consecutive trials of each set were given and the pages containing six stimuli were always given first, followed by the eight, ten and twelve item sets. In this way a subject would be given a total of eighteen pages in the section dealing with six items, twenty-four for the eight-item set, thirty for the ten-item set and thirty-six pages in the section requiring him to examine twelve drawings. On any given trial, the subject was presented with a pile of sheets of paper consisting of the entire set needed to administer all three trials of that particular set. Blank sheets of paper separated each trial from the next trial in the set.

Subjects were requested to touch only one picture on each page

and not to touch one picture more than once in each trial. In that way the subject was actually touching the pictures in sequence according to a plan which he initiated and monitored. An example of the first page of the six-item display is found in Figure 3. In the Self-Ordered Task no time constraints were imposed; however, the subject was cautioned not to go too quickly or he would not have time to examine all the pictures and not to go too slowly or he might forget which drawings he had already touched. The instructions used with the subjects appear in Appendix I.

METACOGNITION

There were four metacognitive elements in the present study:

Questionnaire on Organizational Skills

Interview Regarding Study Habits

Ongoing Interactions

Task Specific Sessions

Questionnaire on Organizational Skills

Description

A twenty-one item questionnaire was developed which paralleled the Questionnaire given to two of each of the subjects' teachers as part of the screening process. The format of presentation of the Questionnaire differed from when it was given to the teachers in that it was altered from a paper and pencil task, where answers on a four-point scale were selected, to a discussion format much like that used in the Interview. Audio recordings were made of their

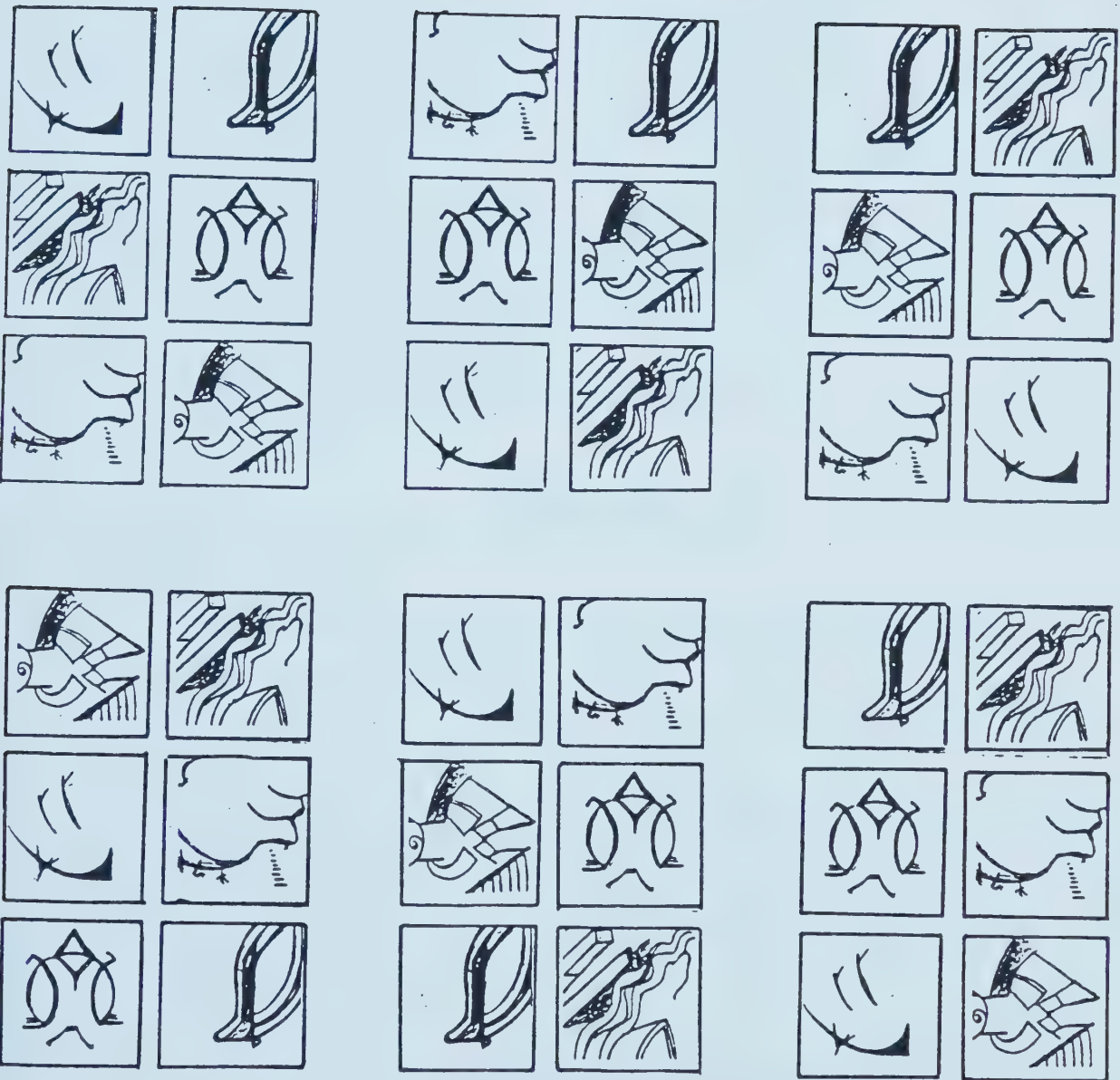


Figure 3: Randomly arranged 6 items of the Self-Ordered Task

discussions. The Questionnaire may be found in Appendix K.

Interview Regarding Study Habits

Description

A nine-question guide was constructed to elicit information from the subjects regarding their knowledge and feelings about their abilities and their study habits. A general question on why some people do well in school was also included. The interview was conducted in a conversational manner with probes being used to elicit more information where necessary. Once again, audio recordings were made. The Interview may be found in Appendix J.

Ongoing Interactions

Description

Students were encouraged to talk aloud as they completed the four tasks comprising the present study. A talk aloud procedure was demonstrated to and practised with the subjects through a demonstration game of X's and O's before the formal study began. Students were encouraged to describe what they were doing as they worked but not necessarily what they were thinking. All tasks were both video and audio taped.

Task-Specific Understandings

Description

At the conclusion of each task, a series of questions were posed to help to discover the student's metacognitive understandings of the

processes and learnings he had experienced. These verbalizations could be compared with the subject's actual task approach and gave insights into his understandings of the task as well as his own cognitive processes. All metacognitive questions used are found in Appendix L.

PROCEDURES

1. School Board permission to conduct the study was obtained.
2. Learning Assistance and Resource Room teachers at the respective high schools were requested to supply the researcher with names of those considered to be learning disabled adolescents.
3. Screening procedures followed the criteria listed under the Initial Screening section of the present chapter were implemented as outlined.
4. Teachers in academic and less academic settings were asked to assess students' organizational abilities by filling in a Questionnaire.
5. Background information in intellectual, achievement, processing abilities was gathered. All procedures were individualized. Parental permission for testing was sought and granted prior to this aspect of the data collection.
6. The Rods, Text Search and Errand Tasks were administered following a Trial-Elicitation-Trial format. The technique was interactive for all the tasks. Probes were primarily designed to enhance the researcher's knowledge of what the student was thinking as he worked. No evaluative remarks were made. Task

and metacognitive sessions regarding the tasks were videotaped and recorded on audiotape.

7. The Self-Ordered Task was administered. Video and audio recordings were made.
8. The Interviews and Questionnaire discussions were conducted with the subjects and recorded on audio tape.
9. Further background on the students' oral and written language skills was gathered.
10. All verbal exchanges made during the task and metacognitive portions of the study were transcribed and analyzed.
11. Video recordings were analyzed to supplement information on the audio tapes and provided a unique contribution to the study.

RECORDING DATA

In studying individual strategic task approach and the organization of behaviour towards an imposed goal, four sources of information were available:

1. Observational notes and checklists recorded during the completion of the tasks.
2. Transcripts of all verbalizations made during task performance and during the questioning to gather metacognitive information.
3. Transcripts of all verbalizations made during the Interview and Questionnaire discussions.
4. Video tape recordings of behaviour. (These formed the principal basis for any timed performance comparisons and were important sources for nonverbal behavioural analysis.)

Observational Record Keeping

The Rods Task

Written notations were made of the rods selected for each phase of the experiment. Recordings included the first free choice, the pairs choice, the second free choice, and the final choice selections. As well, brief written information was recorded on the construction of the independent test and key words of the metacognitive responses were noted.

The Text Search Task

A simple checklist helped in recording whether the subject had used a Type 1, 2 or 3 strategy in the first free choice and the second free choice. Choices on the elicitation phase were also recorded. A summary of verbalizations using key words was made in the metacognitive phase.

The Errand Planning Task

A summary of each subject's verbalizations was made under the headings: First Free Plan; Choice; Second Free Plan; and Metacognition.

The Self-Ordered Task

Three squared sheets for each set of 6, 8, 10 and 12 drawings allowed the examiner to check the square pointed to by the student. The rapid nature of this task precluded the taking of observational notes.

Verbalizations

Nature of the Verbalizations

Verbal protocol analysis is described in the study of strategies used in problem solving (Simon and Simon, 1978) and in reading comprehension (Kavale and Schreiner, 1979; Kavale, 1980). According to Olshavsky (1976-77), protocol analysis requires the subject to think aloud as he works, a technique learned and practised prior to the experimental experience. It is an introspective technique in that the task requires the subject to "report his process as it occurs" (Olshavsky, 1976-77, p. 661) when he was completing the task. The latter method requires the subject to theorize about what he has done while the former asks him to talk as he goes. This definition of introspection is somewhat more liberal than the more traditional approach which required that the "subjects become detached or external observers of their own consciousness" (Aanstoos, 1983, p. 250).

The present study utilized both introspective and retrospective elements. The subject was asked to think aloud as he worked but was also asked to think back about his task performance in a descriptive and evaluative manner. As well, he was asked to think in a predictive sense. For example, on the Rods Task, forward-looking probes such as "What do you think will happen?" were asked before the trial began, while the performance was followed by retrospective questions such as "What did you learn about bending from these rods?". Students were also encouraged to explain their rod choices as they worked. More detailed information regarding the specific

questions asked may be found in the task administration procedures.

In the present research, a study was also made of the students' knowledge about their cognition. Few studies investigating the type of retrospection referred to as metacognition are as detailed and precise as the Meyers and Paris (1978) interview study which investigated twelve-year-olds' metacognitive awareness of variables which influence reading. These questions have been used as models for some of the metacognitive questioning used in the present study. Metacognitive components were included in an attempt to sharpen the present picture of inefficient task approach.

Since the development of children's meta-cognitive knowledge is associated with efficient learning, remembering and communicating, it may provide a critical link in explaining the transition from a novice to a sophisticated problem solver. (Meyers and Paris, 1978, p. 680)

Once the verbal data was gathered, it was examined against the Luria (1973b) framework and probed for what other information it could yield.

Utilizing Transcripts

Several approaches have been taken in the literature to the analysis of transcripts of research proceedings. The verbal protocol technique of Newell and Simon (1972) is a widely quoted methodology and has been used to study problem solving in cryptarithmic, logic and chess. In this method, protocols are set up by recording what the subject says as he solves a problem. The protocols are verbatim transcripts of the session with the subject "thinking aloud" as he

works.

Glass, Holyoak and Santa (1979) have outlined a step by step description of protocol analysis and have said:

The first step in doing a protocol analysis is to break up the transcript into fragments that correspond to different states of the subject's knowledge or mental activity. This division is done intuitively by the experimenter. The result is a series of labelled statements . . . (p. 413)

The next step is to identify the general type of approach the subject is taking to the problem. Once that approach or "space" has been identified the experimenter isolates the subject's specific operations as he moves from one knowledge state to another. At this point behaviour graphs or schematic outlines for the problem solving process are designed. In these graphs, boxes represent new knowledge states and arrows represent the operations which change one knowledge state to another and the nature of the subject's thought processes are easily followed.

Hayes-Roth and Hayes-Roth (1979) also utilize thinking-aloud protocols. Subjects are asked to plan a day's errands and describe "their observations, reasoning, thoughts and decisions while developing their plan" (Goldin and Hayes-Roth, 1980, p. 13). The goal of the Goldin and Hayes-Roth (1980) study was to "identify features of the planning process that distinguish good planners from poor planners" (p. 2). Once recorded, protocols are divided into units with each segment representing a decision. The protocols are then examined for statements which relate to the opportunistic model

developed by Hayes-Roth and Hayes-Roth (1979).

. . . in contrast to some other protocol coding methods (cf. Newell and Simon, 1972), we chose to analyze only the surface content of the protocols, that is, decisions that were openly verbalized, rather than infer the content of subject's covert processing. (Goldin and Hayes-Roth, 1980, p. 15)

In the Goldin and Hayes-Roth (1980) approach, good plans are defined in a quantitative manner. Five criteria are set up and then operationalized each on a 100 point scale (see Table 13).

Following what he terms a phenomenological approach, Giorgi (1975) initially outlines his descriptive data by verbatim transcriptions of the utterances of the researcher and subject. The first analytic step he takes is to divide the subject's expressions into natural meaning units. The verbalizations remain unaltered but are separated into units of meaning and enumerated. Separations are made at the researcher's discretion and no reference to the purpose of the study is made when considering the divisions. "By so deliberately avoiding concentrating attention on any pre-determined aspect, the researcher is able to escape the danger of finding only what one expects to see" (Aanstoos, 1983). These natural meaning units described by Giorgi are recorded in the left hand column of a table while in the right column the researcher states in simple terms the central theme of each unit. These central themes are then placed into a second table, the first column listing statements answering "what" or structure questions and the second answering "why" or style questions. The next step is to attempt to "tie together into a descriptive statement

Table 13

Rules for Scoring Plans Against Evaluation Criteria, Goldin and Hayes-Roth (1980)

Criterion	Rule
Number of Errands Accomplished	Score = % of requested errands planned and executable in available time
Number of Important Errands Accomplished	Score = % of important errands planned and executable in available time (importance value 4.0)
Realism	Score = $100 - \frac{100 \times (\text{Time to execute plan} - \text{Time available})}{(\text{Time Available})}$
Route Efficiency	Score = $100 - \frac{100 \times (\text{Planned route length} - \text{Optimal route length})}{(\text{Optimal route length})}$
Explicit Constraints Satisfaction	Score = % of time constrained errands specified in scenario that could be satisfied if the plan were executed

the essential, non-redundant themes" (Giorgi, 1975, p. 88). Giorgi (1975) points out that the descriptions can be specific to the situation or more transsituational. These descriptive statements are summative in nature and can be reported in individual tables which are classified into "what" (structure) and "why" (style) categories. According to Giorgi (1975) the methodology just outlined is a demonstration of "how one deals systematically with data that remains expressed in terms of ordinary language" (p. 96). Such data differs from the schematic drawings of Newell and Simon (1972) and has none of the attempts to quantify found in the work of Goldin and Hayes-Roth (1980).

The present study utilized aspects of all three of the methods which have been discussed. For example, analysis included attempting to match data to the Lurian organizational framework utilized in the questionnaire much as Goldin and Hayes-Roth (1980) match their data to the opportunistic model. Close comparison of the subjects' work was made as is done in the research of Simon and Simon (1978). An examination of the data following Giorgi's (1975) approach was employed as an efficacious and less structured manner of data reduction and exploration. The aspect of the Giorgi (1975) technique which has the researcher look for comments which are specific to the given situation and those which are transsituational was a particularly interesting application in the present study. Brown and Palincsar (1982) have discussed the relative value of training specific, general and intermediate-level strategies to task approach. The tasks in the present study provided a rich information

source from which to obtain such profiles. While the present study is not pure phenomenological research, it employs many techniques of the methodology.

PHENOMENOLOGICAL ASPECTS

The present study followed a more traditional experimental approach to research in that it utilized operational definitions and a standardized presentation of task requirements. In some aspects of the study, subjects were observed according to preconceived frameworks; however, there was also an attitude of openness about the study which was reflective of the phenomenological aspects of the design. In the present study, interactive elements in which the subject sought and received clarification were permitted. Restrictions were not placed on the number of repetitions of instruction. Subjects were also encouraged to describe their actions, their thoughts and their reactions. In phenomenology, "one is still bound by the phenomenon, and one still has the obligation to be systematic and rigorous" (Giorgi, 1971a, p. 14). In a truly phenomenological approach, methodology is devised to fit the phenomenon. Insofar as the methodology adopted in the present study utilized probes and varied cueing dependent on the subject's performance, the methodology was not standardized. As well, each subject's individualized task approach was accepted, for it was just that individuality which was of interest. Each task utilized was initiated by an open-ended question and the role of the researcher

was more of one who described than one who measured. "The method of phenomenology essentially involves the process of intuition, reflection and description" (Giorgi, 1971a, p. 10).

Quantitative factors were involved in drawing conclusions about some of the frameworks, however. For example, the determinant of spontaneous use of control-of-variables strategy in the Rods Task was use of four of the six variables in unconfounded tests. Yet the study is essentially more research than experimentation. Giorgi (1975) defines phenomenology as "the study of the structure, and the variations of structure, of the consciousness to which any thing, event or person appears . . . elucidating both that which appears and the manner in which it appears . . . " (p. 83).

SPECIFIC ANALYSIS PROCEDURES

Academic Skills Assessment

Tests

The following tests and subtests were administered individually to each of the seven subjects:

1. Weschler Intelligence Scale for Children - Revised (WISC-R) or Weschler Adult Intelligence Scale Revised (WAIS-R).
2. Woodcock Reading Mastery Tests
 - Word Identification
 - Word Attack
 - Passage Comprehension
3. Wide Range Achievement Test
 - Arithmetic Subtest

4. Specific Language Disability Test (Malcomesius)

Test 1 - Visual to Motor

Test 2 - Visual to Motor

Test 3 - Visual Discrimination

Test 4 - Visual Memory

Test 5 - Visual Memory to Motor

Test 6 - Auditory Discrimination

Test 7 - Auditory Memory to Motor

Test 8 - Auditory to Visual

5. Detroit Tests of Learning Aptitude (Detroit)

Test 2 - Verbal Absurdities

Test 6 - Auditory Attention Span for Unrelated Words

Test 13- Auditory Attention Span for Related Syllables

6. The Clinical Evaluation of Language Functions (CELF)

Subtest 4: Processing Relationships and Ambiguities

Subtest 11: Producing Formulated Sentences

8. The Fullerton Language Test for Adolescents (Fullerton)

Subtest 5: Divergent Production

Subtest 6: Syllabication

Subtest 7: Grammatical Competency

8. Students were asked to describe orally a thematic picture from which a narrative story could evolve.

9. Using another picture, which again lent itself to description but was much more abstract in nature than the picture used in #8, subjects were asked to tell the story of the pictures in writing.

Analysis

Tests were scored, and the information gleaned formed part of the case study profiles found in Chapter VI. Where appropriate, task performance and verbalized opinions were related to these performance scores. Detailed information on the results of these measures may be found in Tables 6, 7 and 8 of the present chapter on Methodology.

Tasks

The Rods Task

Determination was made of

- the differences in use of confounded and unconfounded tests from free choice trial one to free choice trial two
- the accuracy of choices in determining the best pair of two pairs to test a particular variable
- the effect of elicitation procedures on control-of-variables strategy and variable identification in the subsequent trial
- the subject's ability to identify good and poor tests of specified variables following elicitation
- the qualitative and quantitative differences in subjects' responses to the question "What makes a difference for bending?" prior to and following the experiment
- the subject's classification as strategy absent, elicited strategy user or spontaneous strategy user based on his employment of the control-of-variables strategy on the first and second free choice trials

- the subject's verbalized understandings of what he had learned from doing the Rods Task.

The Text Search Task

Determination was made of

- the subject's success in finding the information required of him in the first trial and second trial
- the types of strategies used in trials one and two (random flipping; use of table of contents and use of index)
- the effects of the elicitation procedures on the subsequent approach to the task
- the types of strategy selected by the subject during the demonstrations (elicitation procedures)
- the subject's classification as strategy absent, elicited strategy user or spontaneous strategy user based on his performance on the first and second trials of the Text Search Task
- the subject's verbalized understandings of what he had learned from doing the Text Search Task.

The Errand Planning Task

Determination was made of

- quantitative factors of movement, time and errands in the three trials
- the effect of elicitation procedures on use of movement, time and errand references in the subsequent trial
- the accuracy of choices on demonstration items (elicitation)

- the subject's classification as a spontaneous or elicited user of time, movement and errand references
- the subject's verbalized understandings of what he had learned from doing the Errand Planning Task

The Self-Ordered Task

Determination was made of

- the total number of errors made by each subject on each set of the Self-Ordered Task
- mean times per set category
- speed of performance ranking
- the number of times one position was successively touched

The information gathered by observation and analysis of data from the four tasks has been reported separately for each task and incorporated in the Case Studies on each subject. Task results may be found in Chapter V and in the Case Studies in Chapter VI.

Metacognition

The Questionnaire on Organizational Skills and the Interview Regarding Study Habits were both conducted in a manner which is close to what Denzin (1970) refers to as the nonscheduled standardized interview or focused interview "in which certain types of information are desired from all respondents but the particular phrasing of questions and their order is redefined to fit the characteristics of each respondent" (p. 125). Each subject clearly understood the researcher's purpose in conducting the study and knew that he would

not be referred to by name. Lofland (1971) as cited by Goetz and LeCompte (1984)

emphasizes that the interviews are conducted more smoothly when prefaced by a brief statement of research purpose, (and) by assurances of protection of respondent identity . . . (p. 129)

Goetz and LeCompte (1984) also stress the importance of effective probing, a technique which was also employed in the present study. However, probes were only employed when necessary to secure elaboration or clarification. It was the examiner's intent to conduct the interviews insofar as possible in a conversational manner.

Metacognitive probes which followed the completion of the Rods, Text Search and Errand Planning Tasks were characterized by the same descriptors just outlined for the Interview and Questionnaire.

Questionnaire on Organizational Skills

Procedure

The questionnaire used with students closely paralleled the initial screening questionnaire filled out by teachers and used to help identify the subjects as disorganized. Transcripts from the questionnaire were analyzed in a manner modelled after the work of Giorgi (1975), which suggests frameworks for data reduction and data interrogation of verbal protocols. The procedure followed is outlined below:

Step One:

All exchanges were transcribed verbatim.

Step Two:

The subjects' verbalizations were segmented into meaning units by examining the transcripts in an open manner with as little consideration of the aims of the study as possible.

Step Three:

All meaning units were restated as simply as possible as themes.

Step Four:

The twenty-one questions were grouped into the six skills which they were designed to tap. These skills were:

1. general organization (Questions 1, 7 and 13)
2. planning (Questions 2, 9, 14 and 19)
3. inspection (Questions 3, 8 and 15)
4. regulation (Questions 4, 10, 16 and 20)
5. verification (Questions 5, 11 and 17)
6. correction (Questions 6, 12 and 18)

Step Five:

Each subject's responses were summarized under the individual questions making up the skill, i.e.:

General Organization

Question #1: Are you on time for class?

- Subject A: on time
 B: usually 10 or 15 minutes late
 C: on time
 D: basically on time
 E: hard to be on time in the morning
 F: usually on time--sometimes late
 G: on time except for first period in morning and after lunch

(See Appendix M for the remainder of the summaries.)

Step Six:

A second series of summary statements were constructed for each skill by grouping the summary statements for the questions under each individual subject. For example, under the General Organization Skill each subject's name was followed by three descriptors for each of the three questions making up the skill, i.e.:

General Organization

Subject A: is on time
 is tidy
 has materials on hand

Note: These groupings were particularly useful in constructing the individual case studies. (See Appendix N for the remainder of the summaries.)

Step Seven:

The responses for each question were classified and then quantified. A table was constructed for each question (see Table 62 as an example).

Step Eight:

The information in the tables was discussed.

Step Nine:

A final summation on the skill was made.

Step Ten:

A procedure was devised whereby the examiner could rank subjects' responses and compare them to the relative rankings of their teachers' ratings on the Questionnaire on Organizational Skills. Transcripts and summary statements were consulted in

this step. Answers to the twenty questions on the Questionnaire were first categorized as "Yes," "No" or "Sometimes" responses. "Yes" and "No" statements were those strongly affirmative or negative while all those answers of a less polar nature were labelled "Sometimes." Summary sheets for each subject including all twenty questions under the six organizational categories were developed. An example follows:

Subject G:

Planning

Question 2: Situation dependent

9: Yes

14: Yes

19: Affirmative response

Step Eleven:

Answers to the twenty questions of the Questionnaire on Organizational Skills were also examined to see if subjects gave some further information beyond an agreement or disagreement to the queries. Those answers with additional information were further labelled with the descriptor example.

The example descriptor was utilized if an example occurred somewhere in the interaction between the examiner and the subject, despite the number of probes required to draw out the example. To further examine the subjects' spontaneous knowledge, the examiner labelled all examples given following the initial question and prior to any further probes as spontaneous example.

An example follows:

Subject G:

Planning

- Question 2: Situation dependent (spontaneous example)
- 9: Yes (example)
- 14: Yes (spontaneous example)
- 19: Affirmative response (spontaneous example)

Step Twelve:

Quantification of the responses was achieved by assigning a "yes" or clearly affirmative response a 3; a "Sometimes" or situation dependent response a 2; and a "No" or clearly negative response a 1, i.e.:

Subject G:

Planning

- Question 2: Situation dependent (spontaneous example) 2
- 9: Yes (example) 3
- 14: Yes (spontaneous example) 3
- 19: Affirmative response (spontaneous example) 3

Step Thirteen:

A further step of establishing ratio scores allowed the researcher to establish relative performances for each skill. For example, in Subject G's case as illustrated in Steps Ten, Eleven and Twelve, the highest score possible would have been 12, achieved from four "Yes" responses. Since Subject G had three "yes" responses and a situation specific response, he achieved a total of 11 points. The ratio established was then 11/12.

Step Fourteen:

Ratio scores were converted into decimal scores, which yielded figures which could be compared more easily. The individual's highest and lowest ratings from the six categories were then determined. An example follows:

Subject B:

General Organization:	.55	lowest
Planning:	.75	
Inspection:	.78	
Regulation:	.75	
Verification:	1.00	highest
Correction	.89	

Step Fifteen:

The rankings established in Step Thirteen were compared with the way teachers in academic and less academic settings had ranked the same subject, i.e.:

	<u>Highest Rating</u>	<u>Low Rating</u>
Subject E:	Correction	Verification
Less Academic Setting:	Correction	Verification
Academic Setting:	General Organization	Regulation

Step Sixteen:

Transcripts were examined for preciseness. A series of descriptors was developed as follows:

1. A single word response. In general these were Yes/No/ Sometimes resonses which were labelled word. If the word gave other information such as "Lost," it was labelled word - precise. Descriptive names of subjects such as "Social Studies" were also labelled word - precise.

2. A comment. Essentially those unitary ideas expressed in one phrase or single sentence statements were labelled comment. They were further described in the following way:

- a. Precise comment: A comment which gave the reader a clear idea of a specific action or understanding and probably a sense that the subject was describing what he actually would do.

Questionnaire Meaning Unit (in part) #7 (Subject A)

Examiner: . . . Like, let's say it's a Math question and you've asked for help and you still don't know what to do - would you - what would you do?

Subject A: I'd just go on to another one.
[Comment (precise)]

Examiner: Another question?

Subject A: Yeh. [Word]

Examiner: And leave it?

Subject A: Yeh. [Word]

- b. General comment: A comment which gave only a general idea of an action or understanding and may, because of its generality, leave the reader less assured of having read a true reported action.

Questionnaire Meaning Unit #13 (Subject A)

Examiner: Do you do that sort of thing usually or would you only do that if you thought there was something wrong?

Subject A: I'd do it if I thought something was wrong. [Comment (general) (parroting)]

Examiner: But you wouldn't redo every question?

Subject A: No [Word]

3. An elaboration. A descriptor of more than one sentence or phrase extending the unitary idea usually by example.

a. Precise elaboration: An elaboration which gave the reader a clear idea of a specific action or understanding and probably a sense that the subject was describing what he actually would do.

Questionnaire Meaning Unit #10 (Subject C)

Examiner: Umhm. You said that you underlined things, then what do you do with that?

Subject C: O.K. Well, umm - Say I'm writing, I've gotten an idea to put in, then I'll write it down and if I - O.K - spelled a word wrong, then I'll underline it and then after I've finished the rough copy, type of thing, I'll go back and get it spelled right or the sentence rearranged or.. [Elaboration (specific)]

b. General elaboration: An elaboration which gave only a general idea of an action or understanding and may, because of its generality, leave the reader less assured of having read a true reported action.

Questionnaire Meaning Unit #30 (Subject D)

Examiner: Would you describe yourself as an organized or a disorganized person?

Subject D: Sometimes I'm organized, sometimes I'm not. [Comment (general)]

Examiner: O.K. What makes you organized, what makes you disorganized?

Subject D: Uh, guess the way I feel that day or if I woke up on the wrong side of the bed, I would be disorganized altogether. If I got up on the right side, I'd be organized - how I feel that day. That's about it. [Elaboration (general)]

Step Seventeen:

Statements labelled as directed in Step Sixteen were also examined carefully to see if they reflected the spontaneous intent of the subject or whether they parroted, agreed or disagreed with the examiner's comments. Subject A's responses as reflected in Meaning Unit #13 quoted as an example of a general comment above simply repeats the examiner's words and thus the term parroting is added to the labeling of the unit.

By the above examples it may be seen that a single meaning unit could contain more than one utterance and therefore conceivably a combination of words, comments and elaborations could be found within one meaning unit. Further criteria for this labeling may be found in Appendix O.

Note: Results of the Questionnaire analysis are found in Chapter V. Details of the data analysis are in Appendices Q through V.

Interview Regarding Study Habits

Procedure

The interview under discussion was based on the subjects' knowledge and feelings regarding their abilities and study habits. These interviews were analyzed in a manner similar to that utilized by Giorgi (1975). The steps in the analysis included data reduction and interrogation of the data and were as follows:

Step One:

All exchanges were transcribed verbatim.

Step Two:

The subjects' verbalizations were segmented into meaning units by examining the transcripts in an open manner with as little consideration of the aims of the study as possible.

Interview Transcription (Subject C)

Examiner: O.K., so you think that the main reason why people do well in school is that they take the time and put more effort into it.

Subject C: Umhum.

Examiner: Anything else?

Subject C: Mmm, [things come easier to them.

Examiner: What do you mean by things?

Subject C: Umm, they find it easier to, umm, learn things, and learn, you know, the subject, and uh things like that.]

14

Examiner: O.K. What do you do when you're left pretty well on your own to do an assignment like, say, writing an essay? What would you do in a situation like that?

- Subject C: Umm. [Study up on it and make notes on what it says and take the text and whatever we've got to study from and then I don't think if a person takes it just right out from the book, they're not learning anything, obviously, and I try to put it in my own words,] whether, 15
you know, sometimes [I try to get the point across and don't really so I don't do so well and then others I will do quite well.] 16
- Examiner: Umhum. So you feel quite comfortable about doing something like that on your own.
- Subject C: [Umhum, oh, yeah.] 17
- Examiner: And that's the procedure you follow.
- Subject C: I don't - yeah - [I don't like working with another person, you know - because that tends to ruin it [Laughs] They don't, together, we don't get exactly the right - you know, we spend more time talking and doing something else than working and it doesn't turn out so well.] 18
- Examiner: O.K. You said the "other materials." What would be some of the materials that you would use?
- Subject C: [Um, well, it would depend on what it is, like if we're doing (indiscernible) then it would be more of an encyclopedia, something like that.] 19

Step Three:

All meaning units were restated as simply as possible as themes, i.e.:

Meaning Unit #18 from Interview Transcription (Subject C)

- Subject C: I don't - yeah - I don't like working with another person, you know - because that tends to ruin it.

[Laughs] They don't - um - together we don't get exactly the right - you know, we spend more time talking and doing something else than working and it doesn't turn out so well.

Interview Theme #18 (Subject C)

Feels working with a partner is not efficient.

Interestingly, in the case of the less verbal students extracting an interview theme did not always mean a condensation of the unit but with some statements it meant elaborating on the terse responses, i.e.:

Meaning Unit #5 from Interview Transcription (Subject A)

Examiner: Have you ever been interested in Social Studies or English in the past?
[Subject had previously singled out these subjects as difficult areas.]

Subject: No.

Examiner: It's always been something you haven't liked very much?

Subject A: Yeah.

Interview Theme #5 (Subject A)

He has never been interested in or liked Social Studies or English (response to examiner's suggestions).

Step Four:

Summary descriptors were written for each subject's responses to the following groups of questions:

1. 1 through 2b
2. 3
3. 5

- 4. 4 and 4a
- 5. 9

Note: The above numbers correspond to question numbers from the Interview Regarding Study Habits found in Appendix J. For these summaries, both thematic statements and the original transcripts were consulted.

Step Five:

Summary tables for each of the five summaries were constructed and the results outlined. Those summary descriptions, tables and results follow the present procedural outline.

Step Six:

Each meaning unit and corresponding theme for Questions 3, 4, 6, 7 and 9 was then examined to see if it gave either an indication of the student's knowledge of his study and work habits and/or if it revealed an awareness of how he regulated those habits. The procedure was one of labelling the theme appropriately. Giorgi (1975) would refer to this procedure as interrogating the data in terms of the questions of the study.

Interview Theme #7 (Subject C)

Found school hard because he found it difficult to read [knowledge of] and felt he should have taken more time [awareness of the need for a regulatory action].

Decisions as to whether to place a "knowledge of" or "regulatory" label on a statement were guided by the work of Brown and Palinscar (1982) quoted in Table 14 of the present

study. Essentially, knowledge about cognition was assigned to statements reflecting the subject's conscious access to knowledge of his behaviours and study habits while regulation statements were those which revealed elements of planning, monitoring and checking outcomes. See Table 14 for an outline of the criteria derived from Brown and Palincsar (1982).

Table 14

Criteria for "Knowledge Of" and "Regulatory" Labels Assigned to Interview Statements

Label	Criteria from Brown and Palincsar (1982)
Knowledge of	Conscious access to one's own cognitive operations Reflection about the cognitive operations of others
Regulatory	Planning - prior <ul style="list-style-type: none">- Predicting outcomes- Scheduling strategies- Using forms of vicarious trial and error Monitoring - during <ul style="list-style-type: none">- Monitoring- Testing- Revising- Rescheduling Checking outcomes <ul style="list-style-type: none">- Evaluate efficiency and effectiveness

Notations were also made when the subject seemed at a loss as to what to do or used a statement reflective of lack of

knowledge as to how he learned or how he could regulate his learning. Examples of such behaviours can be seen when the subject reports being totally helpless in a relatively straightforward situation and can progress only by turning the problem over to another.

Step Seven:

Following the same procedures used in Step Six, transcripts and themes were interrogated to see if "knowledge of" statements gave general or specific information.

Interview Theme 19 (Subject C)

Uses the encyclopedia if asked to write a paper
[knowledge of (general)]

Interview Theme 24 (Subject D)

Types because his writing is so poor but many marks are lost because of typographical errors
[knowledge of (specific)]

Step Eight:

The total number of themes falling into Specific "knowledge of," general "knowledge of" and "regulatory" were ranked and compared with the rankings of the same three groupings of themes labelled as spontaneous to see if the two were constant, similar or differing. For example:

		General	Specific	Regulatory
Subject A	Total	1	2	3
	Spontaneous	1	3	2
	(Differing)			
Subject C	Total	3	2	1
	Spontaneous	3	2	1
	(Constant)			

Step Nine:

Themes and transcripts of responses to Questions 3, 4, 6 and 7 were again examined to see if the subject's statements were spontaneous or if they were parrotings of or agreements with the examiner's statements.

The labeling of statements as "spontaneous" versus "prompted" is somewhat artificial as the majority of statements were not truly spontaneous but initiated by direct questioning. Statements were labelled "prompted" when the examiner offered a suggestion which was subsequently responded to with a yes, no or sometimes. For example, if the examiner said, "Do you talk out loud to yourself when you study?" and the subject said, "Yes," the theme S. talks aloud when studying was labelled as a prompted theme. Prompted labels were also ascribed to themes bearing information which the subject had merely parroted from the examiner's probes. If the subject expanded in any way on the examiner's words, his response was counted as spontaneous. For

example, if the examiner said, "Have you ever tried taping?" and the subject responded, "Taping a class? I used to tape but I haven't taped this year at all," the theme has taped classes in the past but not presently was labelled as a spontaneous theme.

Note: In labeling themes, content of the verbatim transcript was essential in separating "knowledge of" from "regulatory" statements as well as determining the degree of specificity reflected by the statement. Taken out of context, the themes did not always give sufficient information for labeling.

Step Ten:

Information gleaned from the Interview, data reduction and data interrogation formed the basis for information used to compile portions of individual case studies.

Note: Results of the Interview analysis may be found in Chapter V. Details of the analysis are found in Appendices W through Z.

Video Tape Analysis

Verbal reports form the raw data of much of the proposed research. In general, the following quotation about phenomenological studies can be applied to verbal protocol studies. "Phenomenology depends almost exclusively upon the power of language for communication and therefore description is its main technique" (Giorgi, 1975, p. 100). Since expressive language problems are common in learning disabled students (Johnson and Myklebust, 1967; Wiig and Semel, 1984; and Lerner, 1985), data collection which relies

solely on transcriptions of the subject's verbalizations could be suspect. Other limitations of verbal protocol methods in general are described by Glass et al. (1979) and are outlined below:

1. Gaps exist where the subject forgets to talk as he goes along or where he seems to have "leaped" to a conclusion without mentioning how he got there.
2. Verbal protocol may be difficult with subjects other than highly verbal college students.
3. Nonverbal reasoning such as visual imagery may not be reported and as well some aspects of problem solving may not be conscious.
4. Being aware of observation, subjects may employ strategies other than those used under more "normal" conditions.

The use of video tapes provided supplementary information to help to fill in any gaps left by the verbalizations. While the nonverbal aspects of reasoning may not be viewed, nonverbal behaviour gave information regarding inspection, regulation and correction. As well, while a student did not say: "I planned my approach for ninety seconds," the video made such information easily attainable. Preciseness was also another benefit of the video recordings. It did occur that a subject, while deep in thought, said something to the effect: "No - not this one - this one." In most cases the examiner probed for additional information or provided a description and asked for confirmation; i.e., "You mean the plastic and not the wooden?" If such a probe was not possible because the subject very quickly entered into a verbal reasoning scenario the researcher did not wish to interrupt, the video provided the necessary supplementary

information.

Contrasting the student's behaviour with his verbalizations was extremely important. Results of the pilot study showed clearly that although students could:

1. evaluate the researcher's performance by choosing the most efficient strategy demonstration from two or three demonstrations and correctly verbalize why their choice was best, and
2. answer metacognitive and procedural questions in a manner indicative of complete understanding of the task at hand,

these same students did not use the strategy they defined as best, in subsequent trials of the task.

Brown and Palincsar (1982) have said that there is "a sharp distinction made between conscious awareness and direction of thought and self-correction and regulation" (p. 2). Although this discrepancy between verbalization and action presents a further argument for use of video, it also speaks to the value of the way in which tasks were set up, providing opportunities for subjects to judge, verbalize and perform.

THE TRIAL-DEMONSTRATION-TRIAL FORMAT

If no attempt had been made to have subjects "try again" following an elicitation phase, it would have appeared that some subjects who did not use a specified strategy in the first trial had "the hang of it" after evaluating the examiner's demonstrations because of their ability to explain correctly how the task should be

done. It was only in actually attempting the task again that it became apparent that what was verbalized and seemingly understood, did not translate into action.

SUMMARY OF ANALYSIS

Through the analysis of video-recorded behaviours and verbal protocol data, made while subjects were completing specific tasks and responding to interview and questionnaire items, examinations were made of:

- The students' abilities to use strategy spontaneously, to use strategy after evaluating demonstration (but not being given instruction), and the subjects' lack of strategy use.
- The subjects' abilities to plan, inspect, regulate, verify, correct and organize themselves in general in academic and less academic settings.
- The comparison of student and teacher opinion on strong and weak organizational skills in academic and less academic settings.
- The extent to which subjects' statements revealed a knowledge of their study habits and/or an awareness of how they regulated their learning.
- The degree to which knowledge of study habits was specific or general.
- The tendency of the subjects to give information spontaneously or to parrot, agree or disagree with the examiner's comments.

- The comparison of task behaviour with underlying ability, academic, processing and language skill scores.
- The comparison between verbalized knowledge and the ability to demonstrate the knowledge concretely.

ARGUING FOR AN IN-DEPTH APPROACH

The aim of the present study was to observe and describe the task approach of adolescent learning disabled students. The tasks utilized provided opportunities for observation over a range of activities. Two of the tasks, the Rods Task and the Self-Ordered Task, resembled rather typical laboratory experiments; the Text Search Task was very close to what might be an ongoing classroom activity and the Errand Planning Task involved skills used in daily living. The tasks encompassed abilities important to "getting along" from day to day. An underlying precept of the study was that not only the students' knowledge, but their knowledge of their knowledge about such activities was important.

... self interrogation concerning the current state of one's own knowledge during problem solving is an essential skill in a wide variety of situations, those of the laboratory, school or everyday life. (Brown, 1977, p. 6)

In choosing subjects for the study, the heterogeneity of the learning disabled population was recognized. In the present research, an attempt was made to study a subgroup: learning disabled adolescents with organizational difficulty. Also, extensive measures were utilized to gain information on underlying skills, further

clarifying just who was being studied.

In the present study, students were defined by

- school system criteria
- accepted definition (National Advisory Committee, 1968)
- ability test profiles
- processing academic and language skill profiles
- organizational skills.

In this group, then, the rationally defined subgroup was made up of learning disabled adolescents with organizational problems. The measures of intelligence, achievement and processing incorporated in the design served to provide information which may lead to an eventual understanding of skill and ability patterns underlying organizational approaches and strategy use.

Although the extensiveness of the testing of the present study is more reminiscent of a clinical evaluation than a traditional research design, such detail may help to overcome one of the principal difficulties with studies in the field of learning disabilities.

. . . general inadequate descriptions of the subject populations being designated as learning disabled make it extremely difficult to draw general conclusions from the L.D. literature with any degree of confidence (Kurland & Campione, 1982, p. 6)

The present study was an initial step. It is anticipated that it will help to lay the foundation for future hypotheses, theories and knowledge of organizational skill subgrouping. However, it must be remembered that, if poor organizers do have specific patterns of

underlying skills, the results may not be immediately apparent.

As is the case with cluster analysis, research using rationally defined subgroups is not likely to produce immediately reliable results. Only programmatic research extending over a period of years will provide a relatively stable picture of subgroup characteristics and knowledge of important variability within subgroups. (Torgeson, 1982b, p. 115)

"Instant" result studies have shown repeatedly that differences exist in the performance of inefficient and efficient learners. The present study acknowledges these differences and is an attempt to add depth to the understanding of some of the underlying reasons for these differences.

Such an in-depth study could not be carried out with a large group of students. There is good support in the literature for utilizing small groups and/or case study approaches. Simon and Simon (1978) used one novice and one experienced student in a study of problem-solving ability in physics. Goldin and Hayes-Roth (1980) used five subjects to study individual differences in planning. Giorgi (1975) analyzed the verbalizations of just one subject as she reflected on "what" and "how" she learned.

Through small, carefully defined groups and extensive qualitative analysis of the verbalizations and the task performance of the individuals of those groups, utilizing a case study approach, the proposed study should contribute to a more detailed understanding of the inefficient learner.

CHAPTER FIVE

RESULTS

SKILLS ASSESSMENT

Results of intellectual (see Table 2), achievement (see Table 6), processing (see Table 7) and language (see Table 8) assessments have been reported earlier. Subjects were ranked from 1 to 7 in terms of highest to lowest score on each measure given. Such ranking was straightforward for all test results but the subtest results from the Detroit Tests of Learning Aptitude. WISC-R and WAIS-R Full Scale, Performance and Verbal IQs; Woodcock and WRAT percentiles, and CELF and Fullerton raw scores were ranked easily. The Detroit scores, reported in age scores, were converted to discrepancy scores before they were ranked. Table 15 shows how discrepancy scores were calculated and rankings determined for the Verbal Absurdities subtest. Age discrepancy rankings for the Auditory Attention Span Subtests were devised in the same way and appear in Table 16. Summary rankings were determined for each subtest (see Tables 16, 17 and 18). Rankings of all subjects on skills measured appear in Table 19 and a summary of the number of skills ranked at each of the seven positions is found in Table 20.

When each ranked position was assigned a value: position 1(7); 2(6); 3(5); 4(4); 5(3); 6(2) and 7(1), and that value was multiplied by the number of times the subject had received a ranking at that level, it was possible to arrive at summative scores which in turn

provided an overall ranking (see Table 21).

Table 15

Age Discrepancies and Rankings on the Verbal Absurdities Subtest of

The Detroit Tests of Learning Aptitude

Subject	Chronological Age	Age Score on Detroit Verbal Absurdities	Discrepancy	Ranking
A	16y 1m	10y 6m	- 5y 7m	7
B	16y 5m	14y 3m	- 2y 2m	3
C	17y 0m	15y 0m	- 2y 0m	2
D	15y 4m	15y 6m	+ 2m	1
E	19y 1m	14y 0m	- 5y 1m	6
F	18y 10m	14y 0m	- 4y 10m	5
G	15y 11m	13y 0m	- 2y 11m	4

Abbreviations: y = years
m = months

Summary Rankings--Verbal Absurdities: 1 D
2 C
3 B
4 G
5 F
6 E
7 A

Organizational rankings were then compared with each of the fifteen measured skills as well as the composite score of those

Table 16

Age Discrepancies and Rankings on Auditory Attention Span Subtests of the Detroit Tests of Learning Aptitude

Subject	Chronological Age	*Age Score On		Discrepancy	Ranking	Age Score On		Discrepancy	Ranking
		Unrelated Words	Detroit			Related Syllables	Detroit		
A	16y 1m	8y 8m		7y 5m	3	8y 0m		8y 1m	6
B	16y 5m	8y 10m		7y 7m	4	9y 9m		6y 8m	2
C	17y 0m	7y 0m		10y 0m	6	10y 3m		6y 9m	3
D	15y 4m	8y 6m		6y 10m	2	10y 0m		5y 4m	1
E	19y 1m	10y 8m		8y 5m	5	13y 9m		5y 4m	1
F	18y 10m	8y 6m		10y 4m	7	12y 3m		6y 7m	4
G	15y 11m	9y 3m		6y 8m	1	8y 0m		7y 11m	5

*Average of simple and weighted score

Abbreviations: y: years
m: months

Table 17

Summary Rankings - Auditory Attention Span for Unrelated Words from the Detroit

Rank	Subject	Discrepancy
1	G	6y 8m
2	D	6y 10m
3	A	7y 5m
4	B	7y 7m
5	E	8y 8m
6	C	10y 0m
7	F	10y 4m

Abbreviations: y = years m = months

skills and the lowest academic mark. Figure 4 outlines these comparisons and also reveals in which comparisons subjects had equal

Table 18

Summary Rankings - Auditory Attention Span for Related Syllables from the Detroit

Rank	Subject	Discrepancy
1	D & E	5y 4m
2	F	6y 7m
3	B	6y 8m
4	C	6y 9m
5	G	7y 11m
6	A	8y 1m
7		

Abbreviations: y = years m = months

WISC-R or WAIS-R										Woodcock				WRAT		CELF				
Rank	IQ		VIQ		PIQ		WID		WA		PC		Arith		C ₄		C ₁₁		Org	
	Org		Org		Org		Org		Org	Org		Org	Org		Org	Org		Org	Org	
1	G	C	D	C	B	C	A	C	G	C	A	C	B	C	A	C	B	C	C	C
2	D	B	G	B	G	B	G	B	A	B	F,G	B	F	B	G	B	F	B	B	B
3	B	E	E	E	C,E	E	B	E	B	E	C	E	C	E	E	E	A	E	E	E
4	E	D	B	D	D	D	C	D	C	D	B	D	D	D	C	D	E	D	D	D
5	C	F	A,C	F	F	F	D	F	D	F	D	F	A	F	B	F	G	F	F	F
6	A	G	F	G	A	G	F	G	E	G	E	G	G	G	D	G	C	G	G	G
7	F	A		A		A	E	A	F	A		A	E	A	F	A	D	A	A	A
Equal:	0		1		3		0		0		0		2		1		0			
1 Up or Down:	3		1		2		3		2		0		1		0		3			
Total:	3		2		5		3		2		1		3		1		3			

Detroit										Fullerton				Lowest Academic Mark		Composite Skill				
Rank	VA		UnW		RelSy1		F ₅		F ₆		F ₇		LM		CS		Org		Org	
	Org		Org		Org		Org		Org	Org		Org	Org		Org	Org		Org	Org	
1	D	C	G	C	D,E	C	B	C	A,B,C	C	B,C,E	C	D	C	B	C				
2	C	B	D	B	B	B	D	B	E,F	B	A,G	B	E	B	A	B				
3	B	E	A	E	C	E	G	E	D	E	D	E	B	E	C	E				
4	G	D	B	D	F	D	F	D	G	D	F	D	C	D	D	D				
5	E	F	E	F	G	F	E	F		F		F	G	F	G	F				
6	A	G	C	G	A	G	C	G		G		G	F	G	F	G				
7	F	A	F	A		A	A	A		A		A	A	A	E	A				
Equal:	0		0		1		1		1		1		1		1					
1 Up or Down:	3		0		3		2		3		3		4		3					
Total:	3		0		4		3		4		4		5		4					

Abbreviations:

Org: Organizational Skills

IQ: Intelligence Quotient

VIQ: Verbal Intelligence Quotient

PIQ: Performance Intelligence Quotient

WID: Word Identification Subtest

WA: Word Attack Subtest

PC: Passage Comprehension Subtest

Arith: Arithmetic Subtests

VA: Verbal Absurdities Subtest

UnW: Auditory Attention Span for Unrelated Words Subtest

RelSy1: Auditory Attention Span for Related Syllables Subtest

C₄: Processing Relationships and Ambiguities

C₁₁: Producing Formulated Sentences

F₅: Divergent Production

F₆: Syllabication

F₇: Grammatical Competency

LM: Lowest Mark

CS: Composite Skill

Figure 4: Comparisons of measured skill level rankings and organizational rankings to show equal and similar rankings.

Table 19

Rankings of all Subjects on Skill Measures

Rank	WISC-R WAIS-R				Woodcock %iles			WRAT %ile		Detroit Discrepancies			CELf (RS)		Fullerton (RS)			
	CA	FSIQ	VIQ	PIQ	WID	WA	PC	Math	VA	UnW	RelSy1	C4	C11	F5	F6	F7		
1	E	G	D	B	A	G	A	B	D	G	D & E	A	B		A	B		
2	F	D	G	G	G	A	F	F	C	D	B	G	F	D	E	A		
3	C	B	E	C	B	B	C	C	B	A	C	E	A	G	D	D		
4	B	E	B	D	C	C	B	D	G	B	F	C	E	F	G	F		
5	A	C	A	F	D	D	D	A	E	E	G	B	G	E				
6	G	A	F	A	F	E	E	G	A	C	A	D	C	C				
7	D	F			E	F		E	F	F		F	D	A				

Abbreviations:

CA: Chronological Age

FSIQ: Full Scale Intelligence Quotient

VIQ: Verbal Intelligence Quotient

PIQ: Performance Intelligence Quotient

Woodcock: Woodcock Reading Mastery Tests

%iles: Percentiles

WID: Word Identification

WA: Word Attack

PC: Passage Comprehension

WRAT: Wide Range Achievement Test

Detroit: Detroit Tests of Learning Aptitude

VA: Verbal Absurdities

UnW: Unrelated Words (Auditory Attention Span for)

RelSy1: Related Syllables (Auditory Attention Span for)

CELf: Clinical Evaluation of Language Function

RS: Raw Scores

C4: Processing Relationships and Ambiguities

C11: Producing Formulated Sentences

Fullerton: Fullerton Test of Adolescent Language

F5: Divergent Production

F6: Syllabification

F7: Grammatical Competency

or similar rankings. Only rankings which were equal and those one higher or one lower were compared. For example, in comparing the Arithmetic subtest of the WRAT rankings to organizational skill rankings, Subjects D and G were ranked equally at fourth and sixth positions while Subject B was ranked first in Arithmetic and second in organizational skills. Thus in the comparison of Arithmetic and Organizational skills, three subjects, Subjects D, G and B were said to have achieved equal or similar rankings.

Eleven of the seventeen comparisons showed a total of three or fewer subjects with equal or similar rankings while the remaining six

Table 20
Number of Skills Ranked at Each of the Seven Ranked Positions

Subject	<u>Rankings</u>							<u>Total of Ranked Positions</u>	
	1	2	3	4	5	6	7	1 to 3	5 to 7
A	(4)	2	2	0	1	2	1	8	4
B	(5)	1	3	2	1	0	0	9	1
C	2	1	3	(3)	(3)	0	0	6	3
D	2	2	2	0	(3)	1	1	6	5
E	(2)	1	1	1	(2)	(2)	(2)	4	6
F	0	(4)	0	3	0	1	(4)	4	5
G	1	(4)	1	2	2	1	0	6	3

Note: Circled scores are the highest for that subject
Example: Subject A had 4 skills which were ranked number 1.

comparisons revealed four or more subjects with equal or similar rankings. The highest total number of possible equal or similar rankings for each comparison was seven. Table 22 shows the frequency of equal or similar rankings between each skill measured; composite skill scores; the subject's lowest academic mark and organizational skill rankings.

Five of the seven subjects obtained equal or similar rankings on organizational skills and their measured Performance IQs as well as organizational skills and their lowest academic mark. Using this method, a trend seemed to establish itself in that subjects with

Table 21
Summary Composite Rankings on all Skills Measured

Subject	<u>Rank times Value times Frequency Score</u>							Total Score	Ranking
	1(7)	2(6)	3(5)	4(4)	5(3)	6(2)	5(1)		
A	28	12	10	0	3	4	1	58	2
B	35	6	15	8	3	0	0	67	1
C	14	6	15	12	9	0	0	56	3
D	14	12	10	0	9	2	1	48	4
E	14	6	5	4	6	4	2	41	7
F	0	24	0	12	0	2	4	42	6
G	7	24	5	8	6	2	0	52	5

Note: Number of skills ranked at each level (see Table 20) have been multiplied by the value assigned to that ranking (i.e.) Subject A had 4 skills ranked in the number 1 position and as the number one position was assigned a value of 7 his Rank x Value x Frequency Score = 28.

Table 22

A Comparison of Rankings of Seventeen Measures and the Subjects'
Organizational Skill Rankings

Number Subjects Attaining Equal or Similar Rankings	Number of Measures on Which Rankings are Obtained	Names of Measures
0	1	- Auditory Attention Span for Unrelated Words (<u>Detroit</u>)
1	3	- Verbal IQ (<u>WISC-R</u> or <u>WAIS-R</u>) - Passage Comprehension (<u>Woodcock</u>) - Processing Relationships and Ambiguities (<u>CELF</u>)
2	1	- Word Attack (<u>Woodcock</u>)
3	6	- Full Scale IQ (<u>WISC-R</u> <u>WAIS-R</u>) - Word Identification - Arithmetic (<u>WRAT</u>) - Verbal Absurdities (<u>Detroit</u>) - Producing Formulated Sentences (<u>CELF</u>) - Divergent Production (<u>Fullerton</u>)
4	4	- Auditory Attention Span for Related Syllables (<u>Detroit</u>) - Syllabication (<u>Fullerton</u>) - Grammatic Competency (<u>Fullerton</u>) - Composite Skills Score
5	2	- Performance IQ (<u>WISC-R</u> or <u>WAIS-R</u>) - Lowest Academic Mark

Interpretation of Table: Example: No subjects obtained equal or similar rankings on one measure--Auditory Attention Span for Unrelated Words.

lower Performance IQs tended to have been rated as having lower organizational skills by their teachers, while those with higher Performance IQs were rated as possessing higher organizational skills by their teachers. The same pattern held true when organizational skill rankings were compared with the rankings of the lowest academic mark achieved.

To attempt to validate this method of comparison, the subject's rankings on Full Scale, Performance and Verbal Intelligence Quotients were compared. Figure 5 outlines these comparisons. Seven of the seven subjects received equal or similar rankings on Full Scale and Verbal IQ score rankings; four of seven subjects received equal or similar rankings when Verbal and Performance IQ rankings were compared; and three subjects had equal or similar rankings when Full Scale and Performance IQ rankings were compared.

TASKS

Results of the Rods Task

Of the seven subjects, none used the control-of-variables strategy spontaneously in the first Free Performance Trial. The strategy could not be elicited from any of the subjects so that it could be demonstrated on the second Free Performance Trial. All subjects were therefore classified as Strategy Absent.

Subjects were encouraged to do several tests during a trial so that they were able to have the opportunity to investigate a variety of hypotheses about bending. The mean number of tests per trial for the First Trial was 7.9 (range 6 to 11) while for the Second Trial

Rank	Weschler Full Scale IQ	Weschler Verbal IQ	Weschler Full Scale IQ	Weschler Performance IQ
1	G	D	G	B
2	D	G	D	G
3	B	E	B	C,E
4	E	B	E	D
5	C	A,C	C	F
6	A	F	A	A
7	F		F	
Equal:	1		1	
1 Up or Down:	6		2	
Total	<u>7</u>		<u>3</u>	

Rank	Weschler Verbal IQ	Weschler Performance IQ
1	B	D
2	G	G
3	C,E	E
4	D	B
5	F	A,C
6	A	F
7		
Equal:	2	
1 Up or Down:	2	
Total:	<u>4</u>	

Abbreviation: IQ: Intelligence Quotient

Figure 5: Comparison of Full Scale, Verbal and Performance IQ Rankings to show equal and similar rankings.

the mean number of tests per trial was 5.6 (range 3 to 8).

Since the control-of-variables strategy was, for the purposes of the present study, said to be present if the subject tested four of the possible six variables by use of unconfounded tests and named each variable being tested, it was important to make a distinction between the number of unconfounded tests employed and the number of variables tested by unconfounded tests. For example, a subject might have done three unconfounded tests--all for material. As he was testing only one variable by unconfounded means, his tests thereby contributed only one unconfounded test to the ratio of unconfounded tests to total number of variables. Table 23 shows the total number of unconfounded tests made by each subject on each of two trials but also shows the number of variables tested with unconfounded tests.

Two of the subjects, Subjects A and F, increased the proportion of variables tested through unconfounded tests on Trial Two over Trial One while three subjects, Subjects B, C and D, decreased that proportion. Subject E made no unconfounded choices and Subject G's proportion of confounded and unconfounded tests remained the same (see Table 24).

When asked to choose which would be the best pair of two pairs to test a particular variable, students were very accurate. Of five choices the mean accuracy score was 4 (range 3-5) (see Table 25).

The pairs selection was the first elicitation step in the Rods Task. Interestingly, the ability to distinguish a confounded test from an unconfounded test was not reflected in the subsequent free choice trial (see Table 26).

Table 23

The Number of Unconfounded Tests Compared with the Number of Variables
Tested with Unconfounded Tests in the Rods Task

Subject	Ratio of Number of Unconfounded Tests to Total Number of Tests per Trial		Ratio of Number of Variables Tested with Unconfounded Tests to Number of Tests Per Trial	
	Trial One	Trial Two	Trial One	Trial Two
A	0/8	1/5	0/8	1/5
B	4/11	3/6	2/11	1/6
C	4/8	1/6	3/8	1/6
D	2/6	0/8	2/6	0/8
E	0/7	0/3	0/7	0/3
F	1/6	3/6	1/6	3/6
G	3/10	1/5	2/10	1/5

Table 24

Increase and Decrease in Number of Variables Tested by Unconfounded Tests from Trial One to Trial Two of the Rods Task

Subject	Trial One	Trial Two	Increase	Decrease
A	0/8	1/5	1/5	-
B	2/11	1/6	-	1/66
C	3/8	1/6	-	5/24
D	2/6	0/8	-	1/3
E	0/7	0/3	-	-
F	1/6	3/6	1/3	-
G	2/10	1/5	-	-

Note: In the first two columns, the numerator is the number of variables tested by unconfounded tests and the denominator is the total number of tests per trial.

After attempting a second Free Performance Trial, subjects were asked to judge whether a displayed pair was a good test of a specific

Table 25

Accuracy of Choosing the Best Test of a Variable in the Rods Task

Subject	No. of Choices	Correct Choices
A	5	4
B	5	4
C	5	5
D	5	3
E	5	4
F	5	3
G	5	5
\bar{X}	5	4

Table 26

Effect of Elicitation Procedure on Control-of-Variables Strategy

Subject	Control-of-Variables First Trial	Percentage of Accuracy on Pairs Choice	Control-of-Variables Second Trial
A	no	80%	no
B	no	80%	no
C	no	100%	no
D	no	60%	no
E	no	80%	no
F	no	60%	no
G	no	100%	no

variable. They were asked to give a Yes or No response and to explain the reason for their decisions. Once again students were very accurate, with no student making more than two errors (see Table 27).

Table 27

Accuracy of Identifying Good and Poor Tests of Specified Variables in the Rods Task

Subject	No. of Questions	No. of Correct Responses	No. of Errors	Independent Test
A	5	5	0	no
B	6	5	1	no
C	6	6	0	yes
D	5	4	1	no
E	5	5	0	yes
F	6	4	2	yes
G	7	6	1.	no
\bar{X}	5.7	5	.57	

Three of seven students were able to independently construct an unconfounded test of a variable of their choice while four were unable to do so. Once again the ability to judge the merits of a demonstration did not necessarily mean the student could apply his knowledge to the construction of an unconfounded test (see Table 27). A summary of the principal findings of the Rods Task can be found in Table 28.

Table 28
Summary of Rods Task Data

Subject	First Trial	Pairs Choice	Second Trial	Final Choice	Independent
A	0/8	4/5	1/5	5/5	incorrect
B	2/11	4/5	1/6	5/6	incorrect
C	3/8	5/5	1/6	6/6	correct
D	2/6	3/5	0/8	4/5	incorrect
E	0/7	4/5	0/3	5/5	correct
F	1/6	3/5	3/6	4/6	correct
G	2/10	5/5	1/5	6/7	incorrect

Note: Trials: numerator is number of variables tested by unconfounded tests; denominator is number of trials
 Choices: numerator is choice showing understanding of control of variable principle; denominator is the number of trials

Following the Rods Task, students were asked to sum up those things which had mattered for bending. These answers were compared

with their responses to the same questions asked prior to any experimentation. A summary of their replies is found in Table 29. A quantitative analysis is contained in Table 30.

Discussions of the Rods Task

While all subjects in the group were classified as strategy absent because they could not demonstrate the ability to hold all other variables constant while testing for four of the six variables

Table 29

Response Summary of Those "Things Which Matter for Bending" in the Rods Task

Subject	Initial Response	Final Response
A	length	length, thickness, substance base
B	thickness, flexibility, length, where you put weights	thickness, length, base, material
C	thickness, length	material, width, length, base
D	length, thickness, density, weights	materials, cores, length thickness, density
E	length, distance weight is from base	weight, length, thickness gravity, rod strength, security in base, mass, material
F	length	weight, length, base, material capability of the resistance
G	length	thickness, material, base, length

Table 30

Increase in Number of Identified Variables

Subject	Expected Response	Initial Response	Final Response	Increase
A	5	1	4	3
B	5	3(4)	4	1
C	5	2	4	2
D	5	3(4)	4(5)	1
E	5	2	4(8)	2
F	5	1	4(5)	3
G	5	1	4	3

Note: Unbracketed figures indicate a response which is one of the four expected.
 Bracketed figures are total responses including expected and idiosyncratic responses.

sequentially, they all obviously learned more about what matters for bending by doing the Rods Task. Only two of the subjects could identify as many as three variables to begin with whereas all subjects could name four of the expected variables by the end of the experiment.

Metacognitive Aspects of the Rods Task

An attempt to investigate metacognitive elements of the experience was made by asking students to judge if they had learned anything about bending from their work and if they had changed their

minds or gained information from the experimentation. Examples of their responses may be found in Appendix E. Students' answers to this question tended on the whole to be limited and concrete. Subjects were also asked to name the things that had mattered for bending, much as they had done before the first trial.

In expanding the examination of iteration of variable names in the Free Performance Trials, an interesting pattern develops (see Table 31). Five of the subjects talked about five or more of the six variables while working, even though none could recall more than four when asked what mattered for bending at the conclusion of the experiment.

The major increase in knowledge of the variables occurred through the first independent investigation, an increase from thirteen total mentionings in the Initial Response to thirty-two total in the First Free Performance Trial. The first elicitation phase, Pairs Choice, in which all variables except position of weight were mentioned by the examiner, did not produce a further increase in number of variables mentioned overall. Indeed, in the Second Free Performance Trial thirty total mentionings occurred, a drop of two. The second elicitation, Final Choice, again did not affect any increase in the total variables listed in the Final Response. Once again the total dropped two to twenty-eight.

Viewing this overall trend in light of individual subjects the same pattern is general but not consistent. Three subjects (B, C and E) mentioned the greatest number of variables in the First Free Performance Trial on the basis of their experimentation and before

Table 31

Identified Variables Across Phases of the Rods Task

Variable	Subject												Totals			
	A				B				C				D			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Material	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Length	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Diameter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Base	✓				✓	✓			✓	✓	✓		✓	✓		
Weight					✓	✓							✓	✓		
Position of weight					✓	✓	✓						✓	✓		
Total expected variables mentioned	1	2	3	4	3	6	5	4	2	5	3	4	3	5	4	
Irrelevant	0	0	0		1	1	0	0	1	0	0	1	1	3	2	1
Total variables mentioned	1	2	3	4	4	7	5	4	2	6	3	4	4	8	7	5
Column 1: Initial Response (listing prior to experimentation) 2: First Free Performance Trial (prior to elicitation) 3: Second Free Performance Trial (following first elicitation) 4: Final Response (listing following second elicitation)																
Circled figures are the highest number of variables named.																
Total Overall	21				0				7				7			
Total in Initial Response	28				7				7				7			
Total in 1st Free Performance	22				3				6				6			
Total in 2nd Free Performance	13				0				4				3			
Total in Final Response	10				1				4				4			
Total in 1st Free Performance	9				2				4				3			
Total in 2nd Free Performance	103				13				32				30			
Total in Final Response																

Column 1: Initial Response (listing prior to experimentation)
 2: First Free Performance Trial (prior to elicitation)
 3: Second Free Performance Trial (following first elicitation)
 4: Final Response (listing following second elicitation)

Circled figures are the highest number of variables named.

elicitation was done. They did not mention as high a number of variables again during the experiment. Elicitation phases did not cause an increase in the number of variables named for these subjects; indeed the number dropped in subsequent activities (see Table 31). A fourth subject (Subject D) also mentioned the greatest number of variables in his first Free Performance, mentioning the same number after elicitation in the Second Free Performance Trial. Thus four of the seven subjects did not verbalize more variables after elicitation. Two subjects (Subjects F and G) also increased markedly the number of variables mentioned between the Initial Response (1 variable) and the First Free Performance Trial (5 variables) but each mentioned one more variable or all the variables in the Second Free Performance Trial following the first elicitation (Free Choice). It would seem then, for six of the subjects, that the self-directed manipulation with the rods was most instrumental in drawing out verbalizations regarding the variables. Trying to list variables at the conclusion of the experiment showed fairly good recall by all but one subject who named two less variables than he had in the First Free Performance Trial. Others named just one less, the same number or two more variables than they had in their first experiment.

One subject, Subject A, had a much different pattern from the others. He mentioned one more variable at each phase (see Table 31), listing more variables in the Final Response than at any other phase of the experiment.

Results of the Text Search Task

Of the seven subjects, three used the most efficient strategy spontaneously (utilizing the index). Other subjects were able to locate the correct answer but did so by using the table of contents to find the chapter and then by flipping through the pages looking at pictures, reading headings and skimming until the answer was eventually found. The remaining subject, while able to use the table of contents, did so inefficiently and afterwards could only page unsuccessfully through the book. Table 32 summarizes the use and effectiveness of strategies by the subjects.

Five of the seven subjects were able to pick the most efficient

Table 32
Success, Efficiency and Type of Strategy Used on Trial One of the
Text Search Task

Subject	Successful	Efficiency Rating	Type of Strategy
A	no	n/a	2
B	yes	fair	2
C	yes	fair	2
D	yes	good	3
E	yes	fair	2
F	yes	good	3
G	yes	good	3

Efficiency rating code: type 1 (successful): poor (random flipping)
2 (successful): fair (table of contents used)
3 (successful): good (index used)

Note: Unsuccessful types were not rated.

of the three approaches to the text during both demonstrations (see Table 32). One subject chose a different strategy in each demonstration. In Demonstration One, Subject B rejected the type 3 strategy because he misunderstood the dual role of the index/glossary, viewing it as a glossary. Although the examiner had referred to the index/glossary using the label "index", and had utilized it as such, the subject said, "...there's no sense in looking through the glossary unless you want to find definitions of words that you don't understand too well." Subject D was not given the opportunity to judge a second demonstration and thus selected no strategy.

Subjects were asked to explain the reason behind their choice during the elicitation phase. Their explanations may be found in Appendix P.

Despite the subjects' ability to judge the most efficient strategy during demonstrations, only one student, Subject C, could be said to use an elicited type 3 strategy in the second trial. Another subject, Subject B, used a type 3 approach but only when he was unsuccessful with a type 2 approach. Three other students, Students D, F and G, had used a type 3 strategy spontaneously in Trial 1 and employed the same method in Trial 2 (see Table 33).

Using a type 3 strategy as the preferred strategy, the students' task performance was classified as "spontaneous" if a type 3 strategy was used in Trial One; "elicited" if used in Trial Two but not Trial One; and "absent" if not used in either trial (see Table 33).

In summary, only three of seven students finding the answer to a

Table 33

Summary of Text Search Task

Subject	Trial One Used	Classification	Demo/ Selected	Demo/ Selected	Trial Two Used	Classification
A	type 2	absent	type 3	type 3	type 2	absent
B	type 2	absent	type 2	type 3	type 2/3	elicited
C	type 2	absent	type 3	type 3	type 3	elicited
D	*type 3	spontaneous	type 3	not done	*type 3	spontaneous
E	type 2	absent	type 3	type 3	type 2	absent
F	*type 3	spontaneous	type 3	type 3	*type 3	spontaneous
G	*type 3	spontaneous	type 3	type 3	*type 3	spontaneous

°qualified

Efficiency rating code:

- type 1 (random flipping)
- type 2 (table of contents used)
- type 3 (index used with table of contents)
- *type 3 (index used without table of contents)

simple question by using a text of appropriate readability used the index in locating their responses on an initial trial. However, whether using efficient or inefficient strategies, six subjects found the appropriate answer. A seventh student, despite having good reading skills, was unable to use the text to find the answer. Although they were able to judge which was the best of three approaches to using a textbook to gain information, three of the subjects were still unable to demonstrate this skill when asked to find information on a subsequent independent trial or Trial Two (see Table 33).

A more detailed analysis of the subjects' approach to their task can be found in Table 34. Only those subjects who used a type 2 strategy are described.

Table 34

Individual Approaches to Type Two Strategy Used in Trial One of the Text Search Task

Subject	Uses Table of Contents	Chooses Appropriate Title From Table of Contents	Flips Pages	Skim Read	Utilizes Pictures	Reads Aloud
A	yes	no	yes	yes	yes	no
B	yes	yes	yes	yes	yes	yes
C	yes	yes	yes	no	yes	yes
E	yes	yes	yes	yes	yes	yes

Discussion and Metacognitive Aspects of the Text Search Task

Metacognitive Question 1 asked students what a good way of using a text would be, while Metacognitive Question 4 required them to tell what they had learned from doing the task. For the most part the answers corresponded (see Table 35). Subject C and G's responses to the two questions varied somewhat but their words reflected their actions. For example, Subject G mentioned the index as the best way of using a text in answering Metacognitive Question 1 but said that he learned to use the table of contents in answering Metacognitive Question 4. The discrepancy was descriptive and accurate when viewed in terms of what Subject G did. He used the index only and could not see any advantage in utilizing the table of contents; however, he knew that he had learned about the use of the table of contents as part of the type 3 strategies employed by the examiner in her demonstrations and thus he verbalized that learning. Subject C described using both the table of contents and the index when he outlined a good method of using a text to find information. As he had used only the table of contents on his own, in Trial 1, he accurately reported learning about the index by doing the task when he answered Metacognitive Question 4.

Responses to Question 4 were compared to what the subjects had done in the second trial. The responses were termed "knowledge of what had been learned" and "regulation of action dependent on knowledge." In short, the investigation looked at whether or not the subjects had employed what they said they had learned. Table 36 provides summary statements on these aspects of the present study

Table 35

Evaluation of Text Search Efficiency--Metacognition Questions 1 and 4

Subject	Question 1: Good way of using text	Question 4: Thing learned by doing task
A	look in glossary	I don't know - that it's easier to find things that you want in the glossary than in the contents.
B	not asked	That you can - well when you can look through - if the index or glossary - if the index is in the back with the glossary - that some indexes are with the glossary - I didn't know that - (Examiner agrees) O.K. that's - that - if you want to find the place - you look in the index well, the glossary instead of just lookin' for the chapter and flippin' through to find out the right page. (This subject added that he would first flip through and then use the index).
C	Ah, look in the table of contents and find a heading that is very close to what you are looking for and look in the glossary and find out if there's a couple of places specifically for the heading you want and then turn to that page and get your information.	Yeah, I didn't realize you could use the index, I didn't think of that.
E	Look at the back just to see what your topic is.	Yeah, you can use the back to find out - the index - to find about where things in the chapters instead of flipping through.

(table continues)

	Question 1: Subject Good way of using text	Question 4: Thing learned by doing task
--	--	--

Subject D was not questioned.

F	Look for the index and the glossary (meant table of contents)	That you should use the index and you should try to find the chapter before you go to the index.
G	Well, you just flip to the index - look it up and if it says - like Earth or something' then you'll look under gravity and stuff and then you'll find it and you'll look at the page and then you'll turn the page	Yeah, that you should look in the table of contents - in school they always tell you that it is going to be in the book so - (Examiner asks when he would use the table of contents). If you were lookin' up a - if you were in school and you went to the library and you were lookin' for something on whatever - whatever - the sun..

while Table 37 outlines the results in chart form. All subjects but Subject F appeared to know what they had learned. In addition to what he had learned by doing the task, Subject F reported that he had learned something which he had actually known at the outset of the experiment; namely, use of the index. Three of the subjects (Subjects A, E and G) did not regulate their actions by their knowledge. Subjects A and E said that they had learned the value of the index but did not use it, while Subject G said he had learned how to utilize the table of contents but did not do so when the opportunity arose. As Subject D was not given the opportunity to respond to Question 4, use of the Regulation column in Table 38 for him was somewhat suspect. However, he certainly did not change his

Table 36

A Summary Comparison--Subjects' Knowledge of What They Had Learned
and The Ability to Regulate Their Actions on the Basis of Their
Knowledge on the Text Search Task

Subject A:	Absent. Said he had learned something which he did not demonstrate. Seemed to know what he had learned but did not regulate his actions accordingly. Recognized best in 2 of 2 demonstrations but could not do.
Subject B:	Elicited (qualified). Said he had learned something which he did not employ as first choice. Seemed to know what he had learned but was hesitant to regulate his actions accordingly. Recognized 1 of 2 demonstrations.
Subject C:	Elicited. Knew what he had learned. Regulated his actions according to his knowledge. Recognized best in 2 of 2 demonstrations. Could do.
Subject D:	Spontaneous. Recognized 1 of 1.
Subject E:	Absent. Said he learned something but never demonstrated. Seemed to know what he had learned but did not regulate his actions accordingly. Recognized best in 2 of 2 demonstrations but could not do.
Subject F:	Spontaneous. Said he learned something which he was already using before the trial. Also knew that he had learned about the table of contents--so he did not know what he had learned. Regulated his actions according to his knowledge. Recognized best in 2 of 2 demonstrations and could do.
Subject G:	Spontaneous. Knew what he had learned. Regulated his actions on the basis of his knowledge but did not employ new found knowledge. Recognized best in 2 of 2 demonstrations but could not do.

approach or regulate his action to conform with what he had identified as best during the demonstration. He persisted in use of the index without the table of contents. Indeed, as Table 38 shows, the same patterns form when comparing the "Type of Strategy Chosen" to "Regulation" as is seen in comparing "Stated Knowledge" to "Regulation" (see Table 37).

Table 37

A Comparison of Subjects' Knowledge of What They Had Learned and Their Regulation of Action on the Text Search Task

Subject	Classification	Knowledge of What He Had Learned	Regulation of Action Dependent on Knowledge
A	Absent	Yes	No
B	Elicited (Qualified)	Yes	Only out of necessity
C	Elicited	Yes	Yes
D	* Spontaneous	Not asked	No
E	Absent	Yes	No
F	* Spontaneous	In Part	Yes
G	* Spontaneous	Yes	No

*modified Type 3 strategy (index only)

It should be noted that the classification of "Spontaneous" in relation to Subjects D, F and G was made on the basis of a modified use of a type 3 strategy. That is, they used the index directly without using the table of contents. While all three subjects chose

the type 3 strategy, which utilized the table of contents and index, as the preferred method, only Subject F went on to utilize the table of contents in Trial 2, Subjects D and G stuck to the index-only method which they had first employed.

Table 38

A Comparison of Subjects' Choices of Demonstrated Strategies and Their Regulation of Action on the Text Search Task

Subject	Classification	<u>Type of Strategy Chosen</u>		Regulation of Action Dependent on Demonstration Choices
		Demo 1	Demo 2	
A	Absent	3	3	No
B	Elicited (Qualified)	2	3	Only out of Necessity
C	Elicited	3	3	Yes
D	* Spontaneous	3	-	No
E	Absent	3	3	No
F	* Spontaneous	3	3	Yes
G	* Spontaneous	3	3	No

*modified Type 3 strategy (index only)

In summarizing the basic information given in the four metacognitive questions used following the Text Search Task, it may be seen that all subjects identified use of the index as the preferred method of finding something in a textbook. All but Subject F recognized the similarities and differences in the strategies they

used between Trial One and Two. Subject F said his methods were the same when he had actually utilized the table of contents in Trial 2 and had not done so in Trial 1. Subject A's response is not representative of the same comparisons other subjects made. That is, as mentioned earlier, he used a type 2 strategy for both Trials 1 and 2 and only used the type 3 strategy on the second trial when further intervention probes were given by the examiner.

While none of the explanations was as thorough as might have been expected, all subjects were able to verbalize reasons as to why one method was better than another or as to why their method was best. All subjects recognized that they had learned something, although Subject B only just acknowledged this by saying "slightly." In stating what they had learned, all subjects with the exception of Subject G mentioned the index. It was appropriate for Subject G not to have mentioned learning to use the index because he was a spontaneous user of a modified type 3 strategy. Subject B's response was interesting because, although he recognized the type 3 strategy as preferential and said its use was what he had learned, he stated categorically that he would still "flip through anyway."

Transsituational Approach

Knowledge of Task Principles

In comparing the Subjects' knowledge of what they had learned with subsequent regulation on both the Rods Task and the Text Search Task, some interesting similarities are evident. Subject F had the most errors in judging whether a particular set of rods was a good

test of a specific variable, and also could not easily state what he had learned on the Text Search Task (see Table 39). All other subjects exercised good judgement in choosing unconfounded tests and in accurately telling what they had learned by doing the Text Search Task. (It should be noted that Subject D was not asked what he had learned from the Text Search Task.)

While it is clear that the task stage elements are not identical

Table 39

Transsituational Similarities in Knowledge of Task and Regulation of Behaviour

Subject	Knowledge of Task		Regulation of Behaviour	
	Rods	Text Search	Rods	Text Search
A	Yes	Yes	No	No
B	* Yes	Yes	No	Yes (out of necessity)
C	Yes	Yes	Yes	Yes
D	Yes	n/a	No	No
E	Yes	Yes	Yes	No
F	Lowest Score	In Part	Yes	Yes
G	Yes	Yes	No	No

*very convoluted responses

from task to task, they both reflect the students' knowledge of the task. In the Rods Task, the examiner placed two rods in the stand and said, "Could you use these Rods to tell for sure if _____ makes a difference for bending? Why or why not?" The subject had to understand the concept of confounded and unconfounded variables to make a decision and explain his reasons. In the Text Search Task the subject had to verbalize understanding of what constituted the most efficient approach. In both tasks, verbalizations reflected understanding.

Regulating Task Approach

Looking across tasks at the Rods and Text Search Tasks, the performance of individual students was again very similar (see Table 39). When asked to construct an independent test in the Rods Task, not all subjects were successful. Three of these, Subjects A, D and G were the same subjects who did not employ the most efficient strategy on the Text Search Task (see Table 39). Two other subjects, Subjects B and E showed an ability to regulate behaviour in one situation but not another.

Of interest here are the comparisons of knowledge of task versus regulatory behaviour on both tasks. Discrepancies in the ability to regulate on the basis of knowledge are of great import to the present study. Despite their knowledge of the task as reflected in their words, three of the subjects (Subjects A, D and G) could not do the task when handed the materials. In short, they could explain the tasks and the conceptualizations behind the tasks but they could not

perform the tasks.

Results of the Errand Planning Task

The Errand Planning Task was analyzed by comparing quantitative factors of movement, time and errands. Three attempts were considered: the initial trial; a second run at the planning, immediately following the first trial; and the third trial which followed an attempt to elicit strategy. In the elicitations, the subjects' abilities to choose efficient rather than inefficient scenarios were examined.

In the following discussion of the Errand Planning Task, the terms spontaneous and elicited are used in connection with the manner in which subjects approached various tasks (see Table 40). In this case "spontaneous" takes on a somewhat different connotation than in the previous tasks. There is, included in the directive preceding the Errand Planning Task, a request to "decide which of the errands you will do, the times you will do them, and how you will get around--will you walk or take a bus, for example?" With this instruction the examiner was giving parameters of a nature which were not included in the other tasks of the present study prior to the first Free Performance Trials.

As well "spontaneous" and "elicited", as used in the Rods and Text Search Tasks, referred to the implementation of a strategy while manipulating materials. The terms "spontaneous" and "elicited" in the Errand Task refer to the use of specific verbalizations made by subjects as they manipulated materials.

Table 40

Possible Spontaneous, Elicited and Minimal Use of Movement, Time and Errand References on the Errand Planning Task

Subject	References		
	Specific Movement	Time	Errand
A	Minimal	Minimal	Minimal
B	Spontaneous (declining)	Elicited	Spontaneous
C	Spontaneous	Elicited	Spontaneous
D	* Elicited (increasing)	Spontaneous	Spontaneous
E	Spontaneous (declining)	* Elicited (increasing)	Spontaneous
F	Spontaneous (declining)	Spontaneous	* Spontaneous
G	Spontaneous	Minimal	Spontaneous

*Redoing seemed to elicit better performance.

In addition, there were actual decreases in the numbers of references from the first to the third trial in movement references, making it hard to give solid labels of "spontaneous user" to subjects who did not seem to be consistent in the references over trials.

Table 41 shows the mean reference total for specific movement, total movement, time, and errand references. Time is the most clearly increasing reference in these mean scores, with movement and errand

means much less unidirectional. A subject-by-subject analysis will follow.

Table 41

Mean Number of References Made of Specific Movement, Total Movement, Time and Errands in Doing the Errand Task

Trial	Specific Movement	Total Movement	Time	Errands
1	11.28	16.71	5.71	10
2	9.8	15	6.83	12
3	10.29	12.57	9	10

Movement References

In the Errand Planning Task, movement references were expected because of the directive to tell "how you will get around, will you walk or take the bus for example." Terminology such as "walk" or "take the bus" when used was considered to be a specific movement reference, while use of "go" or "come" was considered to be a general movement reference. Through elicitation, it was hoped that the subjects would increase specific movement references if they had not used such references spontaneously. In comparing performances from the first to the third trial (see Table 42), two of the seven subjects (Subjects C and D) increased their use of specific movement references, while four subjects (Subjects A, B, E and F) decreased their levels of specificity in movement references. One subject,

Table 42

Use of Total and Specific Movement References in the Errand Planning Task

Subject	Trial			Number of Movement References Trials 1 to 3	Number of Specific Movement References Trials 1 to 3
	One	Two	Three		
A	6/6	n/a	4/5	Decrease	Decrease
B	19/15	7/10	11/13	Decrease	Decrease
C	12/17	10/14	13/15	Decrease	Increase
D	5/9	7/12	8/13	Increase	Increase
E	14/17	10/14	7/12	Decrease	Decrease
F	11/22	15/25	7/12	Decrease	Decrease
G	12/21	10/15	12/18	Decrease	Same

Numerator: Specific movement references

Denominator: Total number of movement references

Subject G, used the same number of specific movement references. Five of the subjects (Subjects B, C, E, F and G) appeared to use references readily in Trial One (see Table 42). In looking at what happened in subsequent trials for each of these subjects, however, much different patterns were revealed. These patterns created some concern in terms of using the labels "spontaneous" and "absent" as well as in determining just how elicitation took place.

First, the discussion will turn to how, in describing the initial references subjects made to specific movements, utilizing the term

"spontaneous" became difficult. To establish some background, the reader must recall that there were 13 possible errands. Since the average number of references to the errands was 10 in the initial trial (see Table 41), an arbitrary number of eight specific movement references seemed a reasonable number of references to expect a subject to make. It amounted to somewhat less than one movement referent per errand. Using this criterion, Subjects B, C, E, F and G were classified as spontaneous (see Table 43). However, although Subjects B and E were considered spontaneous users of specific movement references in that they made 19 and 14 references respectively on trial one (see Table 43), by the third trial their references to specific movement had dropped by eight references for Subject B and by seven references for Subject E (see Table 44). Subject E's final number of references (7) to specific movement was just one point above Subject A's initial number of references (6) which were considered minimal.

Further, while Subject E showed a decrease from trial to trial, Subject B's references dropped in Trial Two by 12 and went up again by 4 in Trial Three (see Table 44), indicating that the demonstration could have prompted his reuse of the references but also showed lack of consistency in his use of specific movement references. No two of the performance scores of the five spontaneous users revealed a similar up/down pattern from trial to trial to trial (see Table 44). Subject F used 4 more references in Trial Two than on Trial One and then 8 fewer in Trial Three than Trial Two (see Table 44). Just redoing the task seemed helpful to Subject F. The demonstration did

Table 43

Numbers of Specific Movement and Total Movement References in Each Trial of the Errand Task

Subject	Trial					
	One		Two		Three	
	Sp	Total	Sp	Total	Sp	Total
□ A	⑥	(6)	n/a	n/a	4	(5)
▽ B	①⁹	(25)	7	(10)	11	(13)
° C	12	(17)	10	(14)	⑬	(15)
° D	5	(9)	7	(12)	⑧	(13)
▽ E	①⁴	(17)	10	(14)	7	(12)
▽ F	11	(22)	⑮	(25)	7	(12)
▽* G	12	(21)	10	(15)	12	(18)
\bar{X}	11.3	16.7	9.8	15	10.3	12.6

Abbreviation: Sp = Specific

Note: Circled figures represent the highest number of references on Trial One.

Underlined figures represent the highest number of references on Trial Two. Could mean elicitation through repetition.

Squared figures represent the highest number of references on Trial Three. Could mean elicitation through demonstration.

*Subject G had two identical scores.

- ▽ Spontaneous Users
- ° Elicited Users
- Minimal User

not elicit improvement. Subject G's references dropped in Trial Two and equalled those of the initial trial in Trial Three (see Table 43). Subject C showed only a very slight increase from Trial One to Trial Three and seemed to benefit both from redoing and observing the demonstration.

Table 44

Changes in Specific Movement References Over the Three Trials of the Errand Task

Subject	Trials		
	One to Two	Two to Three	One to Three
A	n/a	n/a	-2
* B	-12 down	+4 up	-8 down
C	- 2 down	+3 up	+1 up
D	+ 2 up	+1 up	+3 up
* E	- 4 down	-3 down	-7 down
F	+ 4 up	-8 down	-4 down
* G	- 2 down	+2 up	0

*Subjects who made the greatest number of references to specific movement in the first trial.

Subjects A and D, the only two subjects not termed spontaneous users, again had different patterns. Subject A made only minimal references and, since his references were below the arbitrary number

of 8, he might therefore have been considered strategy absent. Subject - A's specific movement references were certainly far below those of the other subjects, but in close keeping with the limited number of errand references he made. Subject D showed small consistent gains from trial to trial to trial but only just reached the figure of 8 references by the third trial. He, too, seemed to benefit from redoing the task as well as judging the demonstrations.

Should there have been no arbitrary quantitative performance set as criteria but, instead, if elicited had been defined as an increase in number of references, Subject C would become an elicited user, as his references showed a slight increase following the demonstration.

Time References

In the Errand Planning Task, time references were expected because of the directive to tell "the times you will do them" (the errands). If the same arbitrary criteria of "eight references for established use" is employed when viewing references to time while completing the errand task, a much different pattern emerges than was seen in looking at movement references (see Table 40).

Three of the subjects, Subjects B, C and E, show elicited use of time references (see Table 45), with Subjects B and C seeming to benefit more clearly from the demonstration and Subject E benefitting both from redoing the task and the demonstration (see Table 45). Subject D's and F's use of time references were termed spontaneous on the first trial because of the number of time references, 12 and 9 respectively. Both subjects showed increases in time references

following redoing the first trial and a subsequent decrease in time references from Trial Two to Trial Three (see Table 46). Subjects A and G did not reach the arbitrary figure of 8 set as established use of time referents and so were said to have minimal use of time references (see Table 46).

Table 45

Changes in References to Time Over Three Trials of the Errand
Planning Task

Subject	Trials		
	One to Two	Two to Three	One to Three
A	n/a	n/a	<u>+4</u>
▽ B	-6	+ <u>1</u>	+5
▽ C	0	+ <u>3</u>	+3
* D	+ <u>2</u>	-1	+1
° E	+3	+2	<u>+5</u>
* F	+ <u>2</u>	-1	+1
▽ G	0	+ <u>4</u>	+4

Note: Circled scores indicate the greatest increase in time references in simply redoing the task.

Squared scores indicate the greatest increase in time references between redoing the task and final trial. Demonstration may have elicited strategy.

Underlined score indicates the greatest increase in timed references between the first and final trial. As Subject A did no second trial, the contrast between redoing and the effect of the formal demonstration is not possible but, as with the squared scores, it may have been elicited in the demonstrations. Subject E seemed affected both by redoing and the demonstration.

Key: ▽ Elicited by demonstration
 * Elicited by redoing the task
 ° Affected by both redoing and demonstration

If the criteria for examination was set at simply showing an increase from trial to trial, then Subjects A and G could also be termed elicited users rather than minimal users of the time references.

Errand References

In the Errand Planning Task, errand references were expected because of the directive to "decide what errands you will do." All

Table 46
Number of Time References in Successive Trials of the Errand Planning Task

Subject	Trial		
	One	Two	Three
A	0	n/a	<div>4</div>
B	6	0	<div>11</div>
C	7	7	<div>10</div>
D	12	<div>14</div>	13
E	5	8	<div>10</div>
F	9	<div>11</div>	10
G	1	1	<div>5</div>
\bar{X}	5.7	6.8	9

Circled scores indicate the highest number of references on Trial Two. Squared scores indicate the highest number of references on Trial Three.

but one of the subjects appeared to use errand references spontaneously (see Table 40) using the criteria of 8 occurrences for established use. Table 47 shows that the spontaneous users included 8 to 12 references completed or done out of a possible 13, the first time they verbalized a plan. Subject A referred to doing only 4 errands on his first plan and did no more in his last plan. Subject F's pattern was less clear than other spontaneous users. He made 8 references to doing errands the first trial but increased his use to include all 13 on the second trial. It appeared that redoing the trial had in itself been very helpful to him. However, in the final trial his score dropped again to 8. With the exception of Subject F, the most variation which occurred between trials on errands reported as done was 2.

Total number of errand references mentioned were also compared from trial to trial for each subject (see Table 47). These included not only the errands which were reported done but those which were reported as rejected. In the first trial, three subjects (Subjects C, D and E) referred to an errand they did not do while in each of Trials Two and Three one subject (Subjects C and G respectively) made such a reference.

Table 48 shows the number of errands which were rejected, inferred or omitted by each subject on each of the three trials. An inferred trial was one in which the subject inferred that the errand was done but did not actually report doing it. For example, a subject saying that he went to the library would have inferred that he returned his books. Rejected errands gave interesting information

about how a student prioritized his errands. Rejecting a T.V. program gave a different sense to the plan than did rejecting studying for the upcoming exam.

Table 47

Number of Errand References and Errands Accomplished in Successive Trials of the Errand Planning Task

Subject	Trial						Maximum Variation	
	One		Two		Three			
	Ref	Done	Ref	Done	Ref	Done	Ref	Done
A	4	4	n/a	n/a	4	4	0	0
B	12	12	12	12	11	11	1	1
C	12	11	13	12	12	12	1	2
D	11	10	10	10	12	12	2	2
E	12	11	12	12	12	12	0	1
F	8	8	13	13	8	8	5	5
G	11	11	12	12	11	10	1	2
\bar{X}	10	9.6	12	11.8	10	10.1	1.4	1.9

Abbreviation: Ref = reference

Note: Errands done were specifically reported as done.

Errands referred were done or specifically verbally rejected.

Errands inferred or simply omitted are not included.

Table 48

Number of Errands Rejected, Inferred and Omitted on Successive Trials of the Errand Planning Task

Subject	Trial								
	One			Two			Three		
	Rej	Inf	Om	Rej	Inf	Om	Ref	Inf	Om
A	0	0	9	n/a	n/a	n/a	0	0	9
B	0	0	1	0	0	1	0	1	1
C	1	0	1	1	0	0	0	0	1
D	1	0	2	1	2	0	0	1	0
E	1	1	0	0	0	1	0	0	1
F	0	2	3	0	0	0	0	1	4
G	0	0	2	0	0	1	0	1	2
\bar{X}	.43	.43	2.6	.33	.33	.5	0	.57	2.6

Abbreviations: Rej = Rejected
 Inf = Inferred
 Om = Omitted

Metacognition

Once they had completed the Errand Planning Task, students were asked the following questions:

1. Could you compare what you did in your first plan with what you did in your last plan? Tell me if you think that there was a difference. Which do you think was the better method? Why?

2. Did you learn anything about planning?
3. What makes a good plan?
4. What do you think about the planning which you did today?

Did you make a good plan?

Detailed discussions of the metacognitive aspects of the Errand Planning Task can be found in the individual case studies developed on each subject. However, Table 49 contains a paraphrased summary of subjects' statements as they responded to these questions. These statements include answers to all of the questions asked but are not necessarily in a particular order. Table 50 gives direct quotations of the students' statements of what they had learned by doing the Errand Planning Task.

Asking students whether they had made a good plan brought all affirmative replies. However, in telling why they made good plans or in describing the differences in their two plans, none of the six questioned seemed to be fully aware of either what they had learned or what they had done from trial to trial. Subject A's reply that his plan was good because he could "get everything in order" was not in keeping with his actual plan in which only four of thirteen tasks were completed. Subject C saw his least efficient plan as his most efficient, giving as his reason that less backtracking was present. In actual fact, he backtracked more in the plan he thought was the better. Subject F had difficulty identifying the trial in which he accomplished the most errands, as did Subject G. Subjects B and E had the least marked problems in their awareness. They simply felt that they had made good plans because they had done all the errands.

While they came close, neither mentioned more than twelve errands on any one trial.

General Comments

The times from which the examiner finished instructions to the

Table 49

Summary of Metacognitive Statements Describing Aspects of Good
Planning Following the Errand Planning Task

Subject	Important Aspects of Planning from all Four Questions
A	Thinking, getting everything in order.
B	Plan everything out, plan your route and destination, being on schedule, doing everything one is supposed to do.
C	Getting more done, using time efficiently, how much you can get done in a certain amount of time, thinking about what you're going to do, not just doing it.
D	Not done.
E	Combining errands, try two different plans and choose the best one, look at everything, get everything done.
F	Doing as much as one can, the time spent on it, doing most everything and going where you feel most needed, even out your time so you can meet appointments.
G	Think out the route you are going on, organize things and maybe even write them out, time yourself to see how much time it takes for each thing, think what would be the fastest, easiest and most important, timing and transportation are important.

Table 50

Quotations of What Was Learned From Doing the Errand Planning Task

Subject	Quotation
A	Planning is important.
B	Just plan everything out.
C	Think about what you're going to do and not just do it.
D	n/a
E	Got to look at everything.
F	Some things don't matter as much and you should even out your time a little better, like - spend so much time for that and this and make sure you got a plan - like - just don't go wherever you want - like, if you have to be somewhere - even out your time so you can be there by that time.
G	Organize things, maybe even write 'em out and then time yourself or something - measure how much time it would take if you - for each thing.

first beginnings of a verbalized plan was recorded (see Table 51). Subjects did not always continue along smoothly at that point; some restarted or asked further direction and those aspects were not timed. Subjects beginning to verbalize within one to three seconds were classified as immediate starts. Those taking longer than ten seconds had their behaviours classified in terms of one of three categories: seeking further guidance through questions; receiving further unsolicited guidance; or quiet examination of materials in a thoughtful manner. Combinations of the previous categories were also identified when plans appeared to have strong elements of two

categories.

Only three subjects (Subjects A, B and E) postponed beginning to verbalize their plans for longer than one minute and only one of those, Subject A, held off for more than two minutes. In examining

Table 51

Number of Seconds Spent Between End of Instructions and Commencing to Outline Daily Errands on the Errand Planning Task

Subject	Task		
	One	Two	Three
A	° 2 min. 19 sec.	n/a	11
B	☆ 1 min. 20 sec.	im	31
C	▽ 22 sec.	im	im
D	□ 32 sec.	im	20
E	▽ 1 min. 52 sec.	im	6
F	☆ 28 sec.	im	im
G	▽ 51 sec.	4	6

Abbreviations: im = immediate start (1-3 seconds)

° primarily composed of examiner supplying unrequested further guidance.

☆ primarily composed of student seeking and receiving further guidance.

▽ primarily composed of student examining materials quietly.

□ a mixture of unrequested further guidance and sought guidance.

Subject A's transcriptions, it was seen that the examiner kept trying to be helpful during that period by extending or repeating directives as Subject A seemed quite at a loss as to how to begin. Overall, the length of planning period did not seem to have any particular effect on the quantitative aspects of movement times and errands. Subject A's plan was idiosyncratic in all aspects. It was worth noting, however, that Subjects B and E, who had the third and second longest preplan periods respectively, verbalized somewhat less confusion as to their understandings of what they had done and learned in the Metacognitive investigation following the Errand Planning Task than did the other subjects.

Elicitation

With the exception of Subject A, subjects were able to select the most efficient scenario from the three demonstration pairs presented to them. Four of the students selected the correct plan immediately in three out of three pairs, while two students self-corrected an initial choice on one of the three demonstrations (see Table 52).

Scenarios used in the demonstration phase of the errands tasks may be found in Appendix H. Subject A, in demonstration 1, chose the first scenario. He seemed to fixate on the time it would take to walk home after dropping off the bike in the second scenario. He did not weigh the time or spatial factors involved. For example, he did not establish for himself that he would be spending over two hours just waiting for his dental appointment. Although he made the correct choice in demonstration 2, he again used the reasoning that

the bus was faster than walking and did not seem aware of the other positive aspects of his choice such as clustering errands in space to save time. On the third demonstration, he gave no clear-cut reason for his choice and merely repeated the events. An overview of the

Table 52

Correct Choices on Demonstration Items--Errand Planning Task

Subject	Number of Demonstrations	Correct Choices
A	3	1
B	3	* 3
C	3	3
D	3	3
E	3	* 3
F	3	3
G	3	3

*one item self-corrected

acceptability of the subject's choices may be found in Table 53.

Discussion of Errand Task

In summary, it may be said that all but one of the students showed increases in their ability to make time references and to include a wider range of time references from the first to last trial of the Errand Task. References to movement became more specific for

Table 53

Correctness of Choices and Reasons in the Demonstrations of the

Errand Planning Task

Subject	<u>Demo 1</u> Correct Choice	<u>Demo 2</u> Correct Choice	<u>Demo 3</u> Correct Choice
A	no	no	no
B	yes	yes	yes
C	yes	yes	yes
D	yes	yes	yes
E	yes	yes	yes
F	yes	yes	yes
G	yes	yes	yes

Abbreviation: Demo = Demonstration

three of the seven subjects. Errand references were made spontaneously by six of the seven subjects on the first trial. Four of the seven subjects showed slight increases in the number of errands done from the first to the third trial. The scores of Subject A were quantitatively much less than the other subjects on measures of movement, time and errands.

Table 40 shows that errand references were made in a spontaneous manner by six of the seven subjects, with five subjects spontaneously mentioning specific movement. It was clearly the time references which came less readily to the subjects, with spontaneous references

being made by only two subjects.

Results of the Self-Ordered Task

Petrides and Milner (1982) report their results in terms of mean error scores in a bar graph format. As no precise mean or standard deviation scores were available, quantitative mean error scores were derived from reading the graphs provided in Petrides and Milner's (1982) work. They are, at best, crude estimates (see Table 54). Error scores of the subjects of the present study were then compared to the estimates of total mean errors for the experimental and control groups in the referenced study.

In viewing the data in terms of the total number of errors made by each subject on all four sets of the Self-Ordered Task as compared to the total mean error scores of the three Petrides and Milner (1982) groups, interesting patterns develop (see Table 55). Four of the seven subjects had scores exceeding the total mean errors of one or more of the normative groups. Two subjects, Subjects D and F, made 21 and 25 errors respectively, considerably higher than the normal group total mean error score of 8.9, the left frontal lobe total mean error score of 15.4, or the right frontal lobe total mean error score of 18.2. Subject E's total score exceeded that of the normal and left frontal lobe groups, while Subject A's total score was higher than the normal group only.

Performances on the individual trials of the Self-Ordered Task were timed. Mean times per set category and speed of performance ranking per set appear in Table 56. As a general rule of thumb, it

Table 54

Estimated Mean Error Scores from Petrides and Milner (1982) Study

Group	Set Categories				Totals
	6	8	10	12	
Normals	1.5/18	2/24	2.4/30	3/36	8.9/108
LFL	2.5/18	3.2/24	4.5/30	5.2/36	15.4/108
RFL	2.2/18	4.8/24	5/30	6.2/36	18.2/108

Note: Numerator is mean number of errors.
Denominator is total number of choices per set.

Abbreviations: LFL = Left Frontal Lobe
RFL = Right Frontal Lobe

Table 55
Individual Error Scores Compared to Mean Error Scores on Self-Ordered Task

Subject	Set Categories					Total	Rank
	6	8	10	12			
A	2	4	1	4	11	3	
B	0	0	1	1	2	1	
C	1	3	1	0	5	2	
D	2	5	5	9	21	5	
E	0	5	5	5	15	4	
F	3	6	6	10	25	6	
G	1	3	0	1	5	2	

Note: Circled Scores = error score higher than or equal to mean error score of normals,
left frontal lobe and right frontal lobe.
Boxed Scores = error score higher than mean error score of normal group but lower
than frontal lobe scores.
Triangled Scores = error score higher than mean error score of normal group and left
frontal lobe group.

Table 56

Average Times Per Set Category and Speed of Performance Ranking on Frontal Lobe Task

Subject	Set Categories										Total	(rank)
	6		8		10		12					
	\bar{X}	(rank)	\bar{X}	(rank)	\bar{X}	(rank)	\bar{X}	(rank)				
A	38.33	3	46.88	2	51.33	2	48.33	2	184.87	2		
B	43.66	6	93.33	7	116	7	154.33	7	407.32	7		
C	38.33	3	49	3	52	3	59.66	4	198.99	4		
D	27.66	2	56	5	56.33	4	49.66	3	189.65	3		
E	41.33	5	54	4	64.66	5	79.33	5	239.32	5		
F	19.33	1	25	1	28.5	1	34	1	106.83	1		
G	40.66	4	69.8	6	100.6	6	150.17	6	361.29	6		

might be said that those who worked slowly did well while those who raced through the task did poorly. There was not a perfect relationship between increasing error count and increasing speed; however, Table 57 shows that in every case the subject with the greatest number of errors did the sets in the fastest time. In two of the four sets the subject with the slowest time had the least number of errors. In all sets, the second fewest number of errors was made in the second slowest or the slowest time for the set. The total error count combining the errors made in all sets showed the subject with the fastest time making the greatest number of errors (Subject F) and the subject with the slowest speed (Subject B) achieving the fewest errors. For most subjects, their ranking in terms of speed of performance remained fairly constant from set to set.

Since there was a strong visual memory component in the Self-Ordered Task, an attempt was made to compare the task with performance on the visual memory skills tapped by the Malcomesius and the Word Identification subtest of the Woodcock Reading Mastery Tests by comparing the subjects' rankings on the measures (see Table 58). All subjects had at least two identical rankings out of four ranked scores. Only two of the seven subjects had rankings which varied more than two points from measure to measure. The Self-Ordered Task error rankings were least like the other test rankings, with only three subjects having identical rankings in the Self-Ordered Task and one or two other visual memory tasks.

In Figure 6. Self-Ordered Task error rankings are compared with

Table 57

A Comparison of Number of Errors and Speed of Task Completion on the Self-Ordered Task

Subject	Errors On Set 6	Speed Ranking Set 6	Errors On Set 8	Speed Ranking Set 8	Errors On Set 10	Speed Ranking Set 10	Errors on Set 12	Speed Ranking Set 12	Total Errors	Overall Ranking
A	2	3	4	2	1	2	4	2	11	3
B	0	6	0	7	1	7	1	7	2	1
C	1	3	3	3	1	3	0	4	5	2
D	2	2	5	5	5	4	9	3	21	5
E	0	5	5	4	5	5	5	5	15	4
F	3	1	6	1	6	1	11	1	26	6
G	1	4	3	6	0	6	1	6	5	2

Circled scores: Lowest number of errors in error columns.
Longest time to do set in speed ranking columns.

Broken circle: Speed ranking of lowest number of errors when the ranking is not representative of the lowest number of errors.

Squared scores: Highest number of errors in error columns.
Shortest time to do a set in speed ranking columns.

each visual memory task ranking and the rankings of the visual memory task rankings are compared to one another. Rankings which are equal

Table 58

A Comparison of Rankings for Performance on Tasks with Visual Components

Subject	SOTE Ranking	WID(W) %ile Ranking	Total VME(M) Ranking	Total GL-FC(M) Ranking
A	3	1	②	②
B	1	③	③	5
C	2	④	④	④
D	⑤	⑤	⑤	3
E	4	⑦	6 (lowest ranking)	⑦
F (lowest ranking)	⑥	⑥	4	⑥
G	②	②	①	①

Abbreviations: SOTE = Self-Ordered Task Errors

WID(W) = Word Identification Woodcock

VME(M) = Visual Memory Errors (Malcomesius)

GL-FCE(M) = Glances - Far Copying (Malcomesius)

%ile = Percentile

Circled scores: Identical rankings for that subject

Squared letters: Subjects whose four rankings varied by no more than two places.

<u>Rank</u>	<u>SOTE</u>	<u>WID</u>	<u>SOTE</u>	<u>VME</u>	<u>SOTE</u>	<u>FCE</u>
1	B	A	B	G	B	G
2	C,G	G	C,G	A	C,G	A
3	A	B	A	B	A	D
4	E	C	E	C,F	E	C
5	D	D	D	D	D	B
6	F	F	F	E	F	F
7		E				E
Equal:	3		1		1	
1 Up or Down:	0		2		2	
Total:	<u>3</u>		<u>3</u>		<u>3</u>	

<u>Rank</u>	<u>WID</u>	<u>VME</u>	<u>WID</u>	<u>FCE</u>	<u>VME</u>	<u>FCE</u>
1	A	G	A	G	G	G
2	G	A	G	A	A	A
3	B	B	B	D	B	D
4	C	C,F	C	C	C,F	C
5	D	D	D	B	D	B
6	F	E	F	F	E	F
7	E		E	E		E
Equal:	3		3		3	
1 Up or Down:	3		2		1	
Total:	<u>6</u>		<u>5</u>		<u>4</u>	

Abbreviations: SOTE: Self-Ordered Task Errors
WID: Word Identification
VME: Visual Memory Errors
FC: Far Copying

Figure 6: Comparisons of Self-Ordered Task Error rankings with Visual Memory Tasks and comparisons of Visual Memory Tasks with one another.

or similar are examined. In this case similar means that the ranking varied by only one position. It is clear that three subjects exhibited equal or similar rankings when the Self-Ordered Task rankings were compared with each of the other tasks. The incidence of equal or similar rankings increased, however, when the visual memory tasks were compared one with the other. Four of the seven subjects had equal or similar rankings when ranked errors from the Visual Memory subtests of the Malcomesius were compared to rankings of the number of glances in the Far Copying task from the same test. Five of the seven subjects had equal or similar rankings when percentile scores from the Word Identification subtest of the Woodcock were compared with the number of glances taken on the Far Copying Task. Six out of the seven subjects had equal or similar ranks on their Woodcock Word Identification percentile scores and the errors made on the Visual Memory subtest scores of the Malcomesius.

It should be stressed again that no attempt was made to ascribe frontal lobe damage or dysfunction through the use of the Self-Ordered Task. It was employed to see if subjects in the present study, who had some clinical characteristics similar to those of frontal lobe patients, would do poorly on a task which differentiated frontal lobe patients from normals. As the purpose of the twenty-point Questionnaire, presented to the teachers of the subjects used in the present study, was to delineate characteristics of disorganized behaviour and as the Questionnaire was based on an attempt to operationalize the descriptors of organized behaviour as Luria describes them in his discussions on frontal lobe function, the

rankings of combined quantitative scores on the Questionnaire on Organizational Skills were also compared with error rankings on the Self-Ordered Task (see Table 59). Five of the seven subjects had

Table 59

A Comparison of Subjects' Organizational Ability and Their Ability to Regulate Behaviour Across Tasks

Ranking	SOTE	Ability to Regulate	Total Org	Ability to Regulate
1	B	mixed	C	could
2	C G	could couldn't	B	mixed
3	A	couldn't	E	mixed
4	E	mixed	D	couldn't
5	D	couldn't	F	could
6	F	could	G	couldn't
7			A	couldn't

Abbreviations: SOTE = Self Ordered Task

Total Org = Teachers' Ratings of Organizational Ability

Note: Ability to regulate refers to performance on the final stages of the Rods and Text Search tasks.

similar rankings on the Questionnaire and on the Self-Ordered Task; that is, their rankings varied from one measure to the other by only one point.

There is no clear correspondence between those who did poorly on the Self-Ordered Task and those who could not regulate their task performance on the Rods and Text Search tasks (see Table 59). One of the three who formed the latter group (see Table 39), Subject D, ranked sixth on the Self-Ordered Task while Subjects A and G did well on the Self-Ordered Task, ranking third and second respectively.

There is somewhat better correspondence between the subjects whose combined teacher ratings on the Questionnaire on Organization Skills were low and those who showed an inability to regulate behaviour on the Rods and Text Search tasks (see Table 59). Subjects G and A could not regulate their behaviour on the tasks indicated and ranked sixth and seventh respectively on the Organizational Skills ratings. The other poor regulator, Subject D, ranked fourth in Organizational Ability as seen by his teachers.

Reporting on the numbers of times subjects successively touched one position while completing the Self-Ordered Task is not especially revealing (see Table 60). It was against the rules of the task to do so and subjects were reminded of what they were doing if they showed no inclination to stop by their own monitoring. There seemed to be no particular pattern of successive touchings with good or poor performance.

Looking at subjects' tendencies to touch the same picture successively as reported in Table 61, however, there is a trend at the extremes of the performance rankings. The subjects who were ranked 1 and 2 had no picture touched successively, and Subject F, who had the greatest number of errors on the Self-Ordered Task, had

Table 60

Number of Times One Position Was Successively Touched in Self-Ordered Task

Subject	Number of Successive Touches		
	2X	3X	4X
A	3	2	1
B	10	0	0
C	7	0	0
D	12	2	1
E	7	4	0
F	10	2	0
G	8	0	0
Total	59	10	2

the highest recorded numbers of repeatedly touching the same picture. The picture was in different positions on the successive stimulus pages.

Table 61

Number of Times a Picture was Touched Twice Successively

Subject	Number of Pictures
A	3
B	0
C	0
D	3
E	3
F	7
G	2

QUESTIONNAIRE ON ORGANIZATIONAL SKILLS

Note: Procedural steps from Chapter IV: Methodology, are repeated here. (See Appendices A through V for analysis details.)

Procedure

The questionnaire used with students closely paralleled the initial screening questionnaire filled out by teachers and used to help identify the subjects as disorganized. Transcripts from the questionnaire were analyzed in a manner modelled after the work of Giorgi (1975), which suggests frameworks for data reduction and data interrogation of verbal protocols. The procedure followed is outlined below:

Step One:

All exchanges were transcribed verbatim.

Step Two:

The subjects' verbalizations were segmented into meaning units by examining the transcripts in an open manner with as little consideration of the aims of the study as possible.

Step Three:

All meaning units were restated as simply as possible as themes.

Step Four:

The twenty-one questions were grouped into the six skills which they were designed to tap. These skills were:

1. general organization (Questions 1, 7 and 13)
2. planning (Questions 2, 9, 14 and 19)

- 3. inspection (Questions 3, 8 and 15)
- 4. regulation (Questions 4, 10, 16 and 20)
- 5. verification (Questions 5, 11 and 17)
- 6. correction (Questions 6, 12 and 18)

Step Five:

Each subject's responses were summarized under the individual questions making up the skill, i.e.:

General Organization

Question #1: Are you on time for class?

Subject A: on time
 B: usually 10 or 15 minutes late
 C: on time
 D: basically on time
 E: hard to be on time in the morning
 F: usually on time - sometimes late
 G: on time except for first period in morning
 and after lunch

(See Appendix M for the remainder of the summaries.)

Step Six:

A second series of summary statements were constructed for each skill, by grouping the summary statements for the questions under each individual subject. For example, under the General Organization Skill each subject's name was followed by three descriptors for each of the three questions making up the skill, i.e.:

General Organization

Subject A: is on time
 is tidy
 has materials on hand

Note: These groupings were particularly useful in constructing the individual case studies. (See Appendix N for the remainder of the

summaries.)

Step Seven:

The responses for each question were classified and then quantified. A table was constructed for each question (see Table 62 as an example).

Step Eight:

The information in the tables was discussed.

Step Nine:

A final summation on the skill was made.

Step Ten:

A procedure was devised whereby the examiner could rank subjects' responses and compare them to the relative rankings of their teachers on the Questionnaire on Organizational Skills. Transcripts and summary statements were consulted in this step. Answers to the twenty questions on the Questionnaire were first categorized as "Yes," "No" or "Sometimes" responses. "Yes" and "No" statements were those strongly affirmative or negative while all those answers of a less polar nature were labelled "Sometimes." Summary sheets for each subject including all twenty questions under the six organizational categories were developed. An example follows:

Subject G:

Planning

Question	2:	Situation dependent
	9:	Yes
	14:	Yes
	19:	Affirmative response

Step Eleven:

Answers to the twenty questions of the Questionnaire on Organizational Skills were also examined to see if subjects gave some further information beyond an agreement or disagreement to the queries. Those answers with additional information were further labelled with the descriptor example.

The example descriptor was utilized if an example occurred somewhere in the interaction between the examiner and the subject, despite the number of probes required to draw out the example. To further examine the subjects' spontaneous knowledge, the examiner labelled all examples given following the initial question and prior to any further probes as spontaneous example. An example follows:

Subject G:

Planning

- Question 2: Situation dependent (spontaneous example)
- 9: Yes (example)
- 14: Yes (spontaneous example)
- 19: Affirmative response (spontaneous example)

Step Twelve:

Quantification of the responses was achieved by assigning a "yes" or clearly affirmative response a 3; a "Sometimes" or situation dependent response a 2; and a "No" or clearly negative response a 1, i.e.:

Subject G:

Planning

Question 2:	Situation dependent (spontaneous example	2
9:	Yes (example)	3
14:	Yes (spontaneous example)	3
19:	Affirmative response (spontaneous example	3

Step Thirteen:

A further step of establishing ratio scores allowed the researcher to establish relative performances for each skill. For example, in Subject G's case as illustrated in Steps Ten, Eleven and Twelve, the highest score possible would have been 12, achieved from four "Yes" responses. Since Subject G had three "yes" responses and a situation specific response, he achieved a total of 11 points. The ratio established was then 11/12.

Step Fourteen:

Ratio scores were converted into decimal scores, which yielded figures which could be compared more easily. The individual's highest and lowest ratings from the six categories were then determined. An example follows:

Subject B:

General Organization:	.55	lowest
Planning:	.75	
Inspection:	.78	
Regulation:	.75	
Verification:	1.00	highest
Correction	.89	

Step Fifteen:

The rankings established in Step Thirteen were compared with the way teachers in academic and less academic settings had ranked the same subject, i.e.

	<u>Highest Rating</u>	<u>Low Rating</u>
- Subject E:	Correction	Verification
Less Academic Setting:	Correction	Verification
Academic Setting:	General Organization	Regulation

Step Sixteen:

Transcripts were examined for preciseness. A series of descriptors was developed as follows:

1. A single word response. In general these were Yes/No/ Sometimes responses which were labeled word. If the word gave other information such as "Lost," it was labeled Word - precise. Descriptive names of subjects such as "Social Studies" were also labelled word - precise.
2. A comment. Essentially those unitary ideas expressed in one phrase or single sentence statements were labeled comment. They were further described in the following way:
 - a. Precise comment: A comment which gave the reader a clear idea of a specific action or understanding and probably a sense that the subject was describing what he actually would do.

Questionnaire Meaning Unit (in part) #7 (Subject A)

Examiner: - Like, let's say it's a Math question and you've asked for help and you still don't know what to do - would you? What would you do?

Subject A: I'd just go on to another one.
[Comment (precise)]

Examiner: Another question?

Subject A: Yeh. [Word]

Examiner: And leave it?

Subject A: Yeh. [Word]

b. General comment: A comment which gave only a general idea of an action or understanding and may, because of its generality, leave the reader less assured of having read a true reported action.

Questionnaire Meaning Unit #13 (Subject A)

Examiner: Do you do that sort of thing usually or would you only do that if you thought there was something wrong?

Subject A: I'd do it if I thought something was wrong. [Comment (general) (parroting)]

Examiner: But you wouldn't redo every question?

Subject A: No. [Word]

3. An elaboration. A descriptor of more than one sentence or phrase extending the unitary idea, usually by example.

a. Precise elaboration: An elaboration which gave the reader a clear idea of a specific action or understanding and probably a sense that the subject was describing what he actually would do.

Questionnaire Meaning Unit #10 (Subject C)

Examiner: Umhm. You said that you underlined things, then what do you do with that?

Subject C: O.K. Well, umm - Say I'm writing, I've gotten an idea to put in, then I'll write it down and if I - O.K - spelled a word wrong, then I'll underline it and then after I've finished the rough copy, type of thing, I'll go back and get it spelled right or the sentence rearranged or..
[Elaboration (specific)]

b. General elaboration: An elaboration which gave only a general idea of an action or understanding and may, because of its generality, leave the reader less assured of having read a true reported action.

Questionnaire Meaning Unit #30 (Subject D)

Examiner: Would you describe yourself as an organized or a disorganized person?

Subject D: Sometimes I'm organized, sometimes I'm not. [Comment (general)]

Examiner: O.K. What makes you organized, what makes you disorganized?

Subject D: Uh, guess the way I feel that day or if I woke up on the wrong side of the bed, I would be disorganized altogether. If I got up on the right side, I'd be organized--how I feel that day. That's about it.
[Elaboration (general)]

Step Seventeen:

Statements labeled as directed in Step Sixteen were also examined carefully to see if they reflected the spontaneous intent of the subject or whether they parroted, agreed or disagreed with the examiner's comments. Subject A's responses as

reflected in Meaning Unit #13 quoted as an example of a general comment above simply repeats the examiner's words and thus the term parroting is added to the labeling of the unit.

By the above examples it may be seen that a single meaning unit could contain more than one utterance and therefore conceivably a combination of words, comments and elaborations could be found within one meaning unit. Further criteria for this labelling may be found in Appendix O.

Results of Analysis Described in Steps Seven Through Nine

General Organization Skill (Questions 1, 7 and 13)

Question 1: Are you on time for class?

Table 62
Response Categories for Question #1

Subject	Yes	No	Usually On Time	Usually Late	Situation Specific
A	X				
B				X (10-15 min)	
C	X				
D			X		
E					X (hard in AM)
F			X		
G					X (except for first periods AM and PM)
Total	2	0	2	1	2

Results of Question 1

Only two of the subjects (A and C) saw themselves as always punctual (see Table 62). Two others (Subjects D and F) felt they were usually on time, while the remaining three (Subjects B, E and G) were consistently late. Thus five out of the seven subjects had some degree of difficulty getting to class on time.

Question 7: Do you think you are tidy about your personal belongings?

Table 63

Response Categories for Question #7

Subject	Yes	No	Sometimes	Situation Specific
A	X			
B			X	
C				X (at home, not at school)
D			X	
E				X (room and notes bad; phys ed. equipment good)
F				X (mostly, unless a bad day)
G				X (room and locker locker messy; only valuables neat)
Total	1	0	2	4

Results of Question 7

All - but one student saw themselves as sometimes tidy and sometimes not tidy (see Table 63). Four of these six were specific about situations in which they were tidier. One student simply saw himself as always being tidy.

Question 13: Do you have pens, erasers, notebooks, etc. on hand?

Table 64
Response Categories for Question #13

Subject	Yes	Usually	Mostly
A	X		
B		X	
C		X	
D	X		
E			X
F	X		
G		X (trouble with pens)	
Total	3	3	1

Results of Question 13

All responses to an inquiry regarding necessary materials were primarily positive (see Table 64). However, four of the seven were

Question 2: *What do you do in class after the teacher gives you an assignment?*

Table 65

Response Categories for Question #2

Subject	Specifically outlined what he would do	Answered positively without specifics	Answer had negative connotations with specifics	Answer had negative connotations without specifics	Answer did not address question
A				✓	
B	✓				
C	✓				
D	✓				
E			✓		
*F		✓			
G					✓
Total	3	1	1	1	1
Positive Total:	4	*Question form varied with Subject F. He was asked, "Do you know what . . . ?"; all others were asked "What do you do . . . ?"			
Negative Total:	2				

Question 9: Do you set out a plan for how you will do an assignment?

Table 66

Response Categories for Question #9

Subject	Yes, with example reflecting understanding	Yes, with example reflecting misunderstanding	Yes, unable to give example	No	Depends on situation
A			✓		
B	✓				
C					✓
D				✓ (except for tool)	
E					✓
F				✓	
G		✓			
Total	1	1	1	2	2
Plan: 3	Situational Plan: 2	Don't Plan: 2			

forgetful at times. One subject (Subject D) confessed to taking only the minimum of materials with him so that others would not borrow possessions which his experience told him were seldom returned.

Summary Statements on the General Organization Skills

The majority of students (five of seven) seemed to see themselves as having varying degrees of difficulty with punctuality. All but one subject saw tidiness as dependent on circumstance and four out of seven forgot materials with differing frequencies. As a general rule, the majority of students responded to these questions by indicating that they displayed these skills infrequently or inconsistently.

Results of Question 2

Four of the seven subjects related specifically what they would do following their teachers' instructions (see Table 65). Three of these four responses were detailed and reflected direction (Subjects B, C and D), while the fourth (Subject E) showed that the subject sometimes did not know how to proceed. Subject G seemed not to care if he knew what to do as long as he looked like he knew what he was doing. The remaining two subjects did not give specific information about their actions.

Results of Question 9

Five of the seven subjects reported themselves planning or planning situationally (see Table 66). However, of the three who said they did plan, only one could produce an example of planning:

Subject B imaged a design before he began building. One of the three described something other than planning: Subject G said he wrote a title, read, and then wrote. Subject A was unable to describe what he did.

Neither of the two situation-dependent planners were specific in outlining how they planned but rather knew when they planned. Subject C planned for important assignments by deciding what would go in each paragraph while Subject E planned essays but not paragraphs.

Question 14: Do you feel as though you have direction when you are working?

Table 67

Response Categories for Question #14

Subject	Usually Lost	Usually Directed	Situation Dependent
A			X (subject)
B			X (familiarity)
C			X (subject)
D		X	
E			X (subject)
F			X
G			X (high school vs elementary)
Total		1	6
Consistently lost		0	
Consistently directed		1	
Situationally lost or directed		6	

Question 19: Do you set priorities when you have to finish a number of assignments or tasks?

Table 68

Response Categories for Question #19

Subject	Just Starts	Date Due	Arbitrary List	Something Liked First	Boring Last	Hardest First	Easiest First	Urgent	Schoolwork	Teacher	Subject Preference
A	✓			✓							
B					✓						
C					✓				✓	✓	
D			✓					✓			
E							✓		✓		✓
F		✓					✓				
G					✓		✓				✓
Total	1/16	1/16	1/16	1/16	1/16	2/16	3/16	1/16	2/16	1/16	2/16

Numerator: Number of responses in that category.

Denominator: Total number of responses.

Note: Circled responses are those which reflect choices which do not set priorities. Squared responses are those which were a selection of an alternative presented by the researcher. Circled and unmarked responses were spontaneous.

Results of Question 14

Only one of the seven subjects reported feeling directed most of the time (see Table 67). For six subjects, feeling lost or directed depended on a particular situation. Five of the six gave specific information regarding what factors made them feel lost. For three, it was a subject area (two in English, one in Social Studies). One subject usually felt lost the first time he was doing a particular assignment and another felt directed in high school but had felt lost and confused in elementary school.

Results of Question 19

Only two of sixteen responses were indicative of random or arbitrary approaches to work (see Table 68). No subject gave responses only of this type; however, Subject A gave some preference as to what he might do first only when a possible alternative was presented. Subject D gave an indication that he gave consideration to urgency; however, without that factor he used an arbitrary list for guidance.

Summary Statements on Planning Skills

Responses to Question #2 showed that the majority of subjects reported knowing what to do after being given instructions and three of those four could be somewhat specific about their actions. In answering Question #9, however, only one student gave specifics of how he planned, even though five subjects had reported doing some planning. Question #14 revealed that six of the seven subjects felt lost at least some of the time when approaching their school work.

Question #19 showed that only two students reported taking an arbitrary approach to prioritizing their work. In general, it might be said that students found they had difficulty telling how they planned and often lost direction when working.

Inspection Skill (Questions 3, 8, and 5)

Question 3: Do you inspect your work as you go along?

Table 69
Response Categories for Question #3

Subject	Yes	No	Situation Dependent
A	X		
B	X		
C	X		
D			*X
E		*X	
F		X	
G	X		
Total	4	2	1

*Subject checks after the work is completed.

Results of Question 3

Five of the seven subjects inspected their work as they went along with only one of the five saying that his checking was dependent on the type of work he was doing (see Table 69). The

latter subject, Subject D, did some checking as he went along (autobody) but for other activities either didn't check (written work) or checked upon completion of the assignment. Subject E did not believe he did an ongoing check but reported that his habit was to go through or have someone else go through his work when it was done. Only Subject F made no mention of checking as he went along or when he was finished. Descriptions of how inspections were done were fairly general (see Table 70) with only one subject actually telling how he would carry out his inspection. Others told why they

Table 70

Classification of Positive Responses to Question #3

Subject	Description	Classification
A	sees if it is right or wrong	Why
B	checks for mistakes	Reworded inquiry
C	reads work after one paragraph	How
D	checks autobody as he goes	Reworded inquiry
G	sees how neat and organized it is	Why

inspected or simply reworded the researcher's input. Three subjects, however, went beyond the limits of the question to discuss the actions they would impose as a result of their inspections (see Table 71).

Table 71

Actions Reported as a Result of Inspection

Subject	Action
A	none
B	redoes portions of what he is building as he works
C	changes as he goes
D	none
E	none
F	none
G	underlines headings

Question 8: Do you check back on earlier parts of an assignment as you work?

Table 72

Response Categories for Question #8

Subject	Yes	No	Strategy Employed
A		X	Concentrates on the part he is working on
B		X	Looks ahead rather than back.
C	X		Checks back in Math. In writing concentrates only on the most recently written sentences.
D	X		Stops to think, then checks the last sentence or two.
E	X		Looks back at questions.

(Table continues)

Subject	Yes	No	Strategy Employed
F		X	No elaboration.
*G	X		Reads what he has written and rewrites if it lacks cohesion.
Total	4	3	

*Apparent misunderstanding of the intent of the question may reflect the manner in which it was posed. This response is more indicative of checking after he has written.

Results of Question 8

Four of the seven subjects reported checking back on earlier parts of their assignments as they worked while three said they did not look back (see Table 72). All but one subject (Subject F) was able to be fairly specific about how they approached this type of inspection.

Question 15: Do you see your errors as you work through an assignment?

Table 73

Response Categories to Question #15

Subject	No	Yes	Mostly	Sometimes	Not Asked	Method
A		X				* Reads over
B				X		Always checks but doesn't see them all. Doesn't think he has method.

(table continues)

Subject	No	Yes	Mostly	Sometimes	Not Asked	Method
C				X		Marks them and comes back later so he doesn't lose his train of thought
D			X			* Skims through.
E				X		* Read and redo
F					°X	
G		X				If it feels right or not. * Checks calculations
Total	0	2	1	3	1	

*Students do not clearly indicate by these responses that the checking for errors occurs during rather than after the assignment.

°In answering question #6, this subject said he found it hard to identify errors.

Results of Question 15

Only six subjects were asked if they saw their errors as they worked. All reported some success in spotting mistakes (see Table 73) but four of the six had at least some degree of reservation about their efficiency. However, the elaborative responses of four left the researcher uncertain of whether a clear distinction had been made in their minds about seeing errors while working and proofreading after completing their work.

Table 74

Summary of Responses to Inspection Skill Questions

Subject	<u>Question #3</u> Do you inspect your work as you go along?	<u>Question #8</u> Do you check back on earlier parts of an assignment as you work?	<u>Question #15</u> Do you see errors as you work through an assignment?
* A	Yes	No	Yes
* B	Yes	No	Sometimes
C	Yes	Yes	Sometimes
D	Depends	Yes	Mostly
* E	No	Yes	Sometimes
F	No	No	Not asked
G	Yes	Yes	Yes

*Possible inconsistency of responses.

Summary Statements on Inspection Skills

In answering question #3, five of seven subjects reported doing at least some inspection as they went along but only one subject discussed how he would carry out such an inspection (see Table 70). Question #8 seemed to be quite similar to question #3 and the questions offered what might, on the surface, be somewhat of a reliability check on one another. In question #8 four of the seven subjects reported checking back on earlier parts of their assignments as they worked, making the global results appear similar to question #3. However, a subject by subject comparison shows that only three students gave the same response to both questions (see Table 74). Conflicting responses seemed to indicate that subjects perceived distinct differences in the intent of the question or in the task

they considered in giving their responses to the questions. Only Subject D appeared to contradict himself (see Table 75) by reporting different behaviours on one task.

Table 75
Seemingly Conflicting Responses to Inspection Questions #3 and #8
Viewed in Greater Detail

Subject	Response to Question #3	Response to Question #8
A	Looks to see if it is right or wrong.	Doesn't check back - concentrates on the part he is working on.
B	Checks for mistakes and redoes portions as he works	Doesn't feel he integrates earlier parts - looks ahead rather than back.
D	Checks autobody as he goes along. Doesn't inspect written work. Might check an exam when finished.	After stopping to think, checks the last sentence or two.
E	Doesn't inspect work as he goes along then goes through or has someone else go through.	Looks back at questions.

The same indication that the two questions did bring to mind similar yet discrete aspects of inspection may be found in the summarized responses of two of the three who responded in the same manner to both questions (see Table 76).

Table 76
Seemingly Similar Responses to Inspection Questions #3 and #8 Viewed in Greater Detail

Subject	Response to Question #3	Response to Question #8
D	At first he said "not really." Reads work over after one paragraph. Checks as he goes rather than waiting until the end. Changes as he goes.	Checks back in Math. In writing, looks back only at most recently written sentences.
F	No	No
G	To see how neat and organized it is. Underlines headings.	Reads what he has written and will rewrite if it lacks cohesion.

In responding to question #15, all six subjects asked felt they saw some errors. It was difficult to tell, however, if four of the

subjects had differentiated between the intent of the question and proofreading after the fact.

Regulation Skill (Questions 4, 10, 16 and 20)

Question 4: Do you start your assignment as soon as your teacher finishes giving directions?

Table 77
Response Categories for Question #4

Subject	Yes	No	Situation Dependent	Comments
A		(X)		Thinks what to do.
B			X	If nothing else he would rather do.
C	X			Doesn't like to put things off in case he forgets.
D			X	What the rest of the class does affects him.
E			X	If reading is involved he may not be able to start.
F		X		Wants to put off work because it's boring.
G		X		Takes a breather first.
Total	1	3	3	

Note: Circled response indicated a delay for planning.

Results of Question 4

Only one subject (Subject C) responded with an unqualified affirmative response to the question regarding prompt initiation of assignments (see Table 77). Of the three subjects who said they did not begin assignments as soon as directions are given, one (Subject A) said he planned what to do before he started. Of the three situation-dependent responses, two (Subjects B and D) said they sought out cues from the environment before beginning. Only one subject (Subject E) mentioned the fact that lack of skill in reading might prevent his working.

Question 10: Do you work out more than one solution to a problem?

Table 78
Response Categories for Question #10

Subject	No	Usually Not	Yes	Sometimes	Comments
A				X	None
B			X		Chooses easiest or compiles features from many in building Tries different ones in Math.
C				X	The odd time - not often.
D		X			Thinks of one and thinks it is the best - agreed he might think of more than one.

(table continues)

Subject	No	Usually Not	Yes	Sometimes	Comments
E	X				Not really.
F	X				No
G	X				No
Total	3	1	1	2	

Results of Question 10

Only one subject (Subject B) gave an unqualified affirmative response when questioned regarding making alternative plans (see Table 78). Three flatly said they did not (Subjects E, F and G), while two others (Subjects C and D) indicated making more than one plan was a rare happening.

Question 16: Do you make corrections as you work?

Table 79

Response Categories for Question #16

Subject	Yes	Sometimes	No	No but does later
A	X			
B				X
C				X
D				X
E		X		
F			X	
G			X	
Total	1	1	2	3

Results of Question 16

Only one subject (Subject A) reported without qualification that he made corrections as he worked (see Table 79). Five of the seven (Subjects B, C, D, F and G) stated that they did not correct as they worked, but three of those (Subjects B, C and D) said they made corrections once they had finished an assignment.

Question 20: Do you usually carry through to the end of an assignment?

Table 80

Response Categories for Question #20

Subject	Yes	No	Sometimes	Reason
A			X	Sometimes loses track.
B			X	Doesn't finish if he doesn't like it.
C			X	Depends on subject.
D			X	If others talk, so will he.
E			X	Sometimes daydreams in English class.
F	X			
G			X	Sometimes rests or draws. Never does a reading assignment in a text.

Results of Question 20

Only one subject (Subject F) reported carrying through to the end of an assignment (unless a legitimate problem is encountered) without qualifying his response (see Table 80). Four of those who admitted to not always carrying through gave reasons which reflected conscious decisions to do something else, while two others (Subjects A and E) gave reasons which, while controllable (i.e., losing track and daydreaming), were not clear refusals to work.

Summary Statements on Regulation Skills

Six out of the seven subjects did not begin their assignments immediately, but only one of those six reported being delayed by a skill deficit. Six of the seven subjects did not regularly work out alternative solutions to problems. Only one subject reported in an unqualified manner that he made corrections as he worked, and only one student reported firmly that he carried through to the end of an assignment unless stopped by skill deficit or by not understanding the assignment. Regulation of work seemed largely absent in this group.

Verification Skill (Questions 5, 11 and 17)

Question 5: Do you think about whether you have done what the teacher has asked you to do?

Table 81

Response Categories for Question #5

Subject	No	Yes	Situation Dependent	Elaboration
A		(X)		Thinks about it.
B		X		Extends beyond what the teacher asked.
C	X			Guesses he should. Usually tries to be very sure he's on the right track before he starts
D		X		None
E			X	Math - yes. Algebra - no. English - sometimes.
F	X			Doesn't want to know if he's wrong.
G	X			Compares with classmates
Total	3	3	1	

Circled response is equivocal.

Results of Question 5

Most subjects did not qualify their responses or indicate that circumstances would change their behaviours when considering whether they compared their completed work with the teacher's instruction (see Table 81). Only one subject (Subject D) saw his behaviour as situation specific. The remainder of the subjects were equally divided between yes and no responses. The two elaborated affirmative answers were an agreement (Subject A) and a conviction that produced

work went beyond the voiced requirements (Subject B). The latter response was categorized as affirmative with some degree of assumption that a comparison would need to be made with the given assignment in order to feel one had moved beyond it. However, arguments might be offered for interpreting the response as a no. The three negative responses included an avoidance technique (Subject F), (which proved to be a pattern with this subject), and two alternate strategies. Subject C spent extra time being sure he understood an assignment before he began, while Subject G checked his work against the others in the class. Subject E seemed very aware of subject areas where he did and did not employ the strategy.

Question 11: Do you check for errors when you finish
 an assignment?

Table 82

Response Categories for Question #11

Subject	No	Yes	Situation Dependent	Descriptor
A		X		Reads to himself or someone else.
B		X		Goes over work. On exams prefers working quickly and checking to working slowly.
C		X		Rereads.
D		X		Autobody - yes. English checks neatness, not content.
E			X	Math - no. English - sometimes.

(Table continues)

Subject	No	Yes	Situation Dependent	Descriptor
F	X			No
G		X		Looks over work but not concerned if he can't do corrections.

Results of Question 11

Six of the seven subjects reported some degree of checking for errors, with only one of the six (Subject E) saying his strategy was employed on a situation-specific basis (see Table 82). Only one subject (Subject F) said that he never checked. Interestingly, while three subjects offered some detail as to when they checked for errors, i.e., exams (Subject B), or subject matter (Subjects D and E), descriptions of how they checked were limited to one comment about speed (Subject B) despite attempts to draw out more information.

Question 17: Do you proofread your written assignments?

Table 83

Response Categories for Question #17

Subject	No	Yes	Sometimes	Comments
A			X	Value is getting to know about errors.
B		X		Reads it over.
C	X	X		

(table continues)

Subject	No	Yes	Sometimes	Comments
D	X			
E				Mom does.
F			X	Proofs essays.
G		X		
Total	2	3	2	

Results of Question 17

Five out of the seven subjects did some proofreading (see Table 83). No elaborative comments regarding the specifics of methodology were mentioned. One student (Subject E), whose reading problems were extremely severe, had his mother do his proofing.

Summary Statements on Verification Skills

Checking for errors and proofing were reported as employed strategies to some degree by six and five of the subjects respectively. However, the subjects could not describe specifically how they worked and spoke instead in very general terms, i.e., "reread" or "look over work." The subjects were more divided on whether they compared finished products with the teacher's assignment. Those employing that approach exceeded those who did not by one. However, once again, descriptors of specific strategies were not given.

Correction Skill (Questions 6, 12 and 18)

Question 6: Do you make corrections without your teacher's help?

Table 84

Response Categories for Question #6

Subject	No	Yes	Situation Dependent	Comments
A		X		Changed his mind no to yes.
B			X	If he has the capability.
C		X		Marks errors and returns to them later. Utilizes others.
D			X	Not if he is tired or mad.
E		X		Goes back and corrects.
F			(X)	Finds it hard to identify errors.
G			X	If there is time. Often waits 'til corrections are taken up in class.
Total	0	3	4	

Circled response indicates a response to a question which was not phrased properly.

Results of Question 6

All subjects felt that they could make corrections independently, at least in some situations. Four (Subjects B, D, F and G) saw

themselves correcting in a situation-dependent manner. Subject C outlined the methodology he used in some detail while the others used more general descriptors. Subjects B and F alluded to skill deficiencies hampering their ability to find errors. Subject D admitted to his performance being affected by mood, while Subject G knew that his work could be corrected without his exerting effort simply by his relying on others.

Question 12: Do you edit or rewrite original draft work?

Table 85

Response Categories for Question #12

Subject	No	Yes	Always	Situation Dependent	Sometimes	Usually
A					X	
B		X				
C						X
D			X			
E			X			
F					X	
G				X		
Total	0	1	2	1	2	1

Results of Question 12

All subjects reported doing editing or rewriting on original work

although there was some variation in how frequently subjects saw themselves engaged in this strategy (see Table 85). Two (Subjects E and E) said they always edited. Comments revealed varying degrees of specificity in the subjects' knowledge of their approaches (see Table 86).

Table 86

Descriptions of Editing Methods

Subject	Comments
A	Rewrites.
B	Scratches out and uses arrows on rough copy and then rewrites.
C	Does only a first and second copy.
D	Always does a rough and a good copy.
E	* Rewrites on a new paper. (Has to because of all the red ink.)
G	An assignment is like presenting yourself, (yet only puts effort into important assignments).

*Subject E did not appear to interpret editing as an independent activity in this situation.

Question 18: Do you hand in what you would call a polished product?

Table 87

Response Categories for Question #18

Subject	No	Yes	Situation Dependent	Elaborations
A		X		
B			X	Puts more effort into a class in jeopardy or one he likes.
C			X	More time on important assignments. May not redo obvious weak areas in lesser assignments.
D			X	Writing if interested. Autobody is the best he can do.
E			X	If he is not required to do it in class. Never hands in in-class assignments - they are unreadable.
F	information not recorded for this subject			
G			(X)	Often not neat as left to the last minute.

Circled response less often polished.

Results of Question 18

Six of six subjects saw themselves as handing in polished products (see Table 87). All the subjects who elaborated on their

responses seemed to have a fairly clear idea of when or where their work was more acceptable. Four of the students (Subjects B, C, E and G) mentioned some aspect of time in their answers. Other factors mentioned were the factors of possible failure (Subject B); the importance of the subject (Subject C); interest in the subject (Subject D); or liking a subject (Subject B). Subject E, who had severe reading problems, knew he was completely unable to function independently on in-class assignments but could hand in something which could be a source of pride if he was given time.

Summary Statements on Correction Skills

All subjects felt that at least in some circumstances they were able to make independent corrections, edit or rewrite, and hand in a polished product. In the case of corrections and producing polished work, situation specificity seemed important to the majority of students. Most students used qualifiers when referring to the degree to which they edited or rewrote original work.

Results of Analysis Described in Steps Ten and Eleven

Table 88 shows the number of responses assigned to "yes," "no" and "sometimes" categories. These responses encompassed all the verbalizations of all subjects on the Questionnaire on Organizational Skills, "Yes" statements included those which were strongly affirmative while "no" statements were strongly negative. No attempt was made to distinguish between usually, sometimes, and all other situation-dependent comments; they were all labelled as "sometimes."

Table 88

Actual Number of Yes, No, and Sometimes Responses to Categories of the Questionnaire on Organizational Skills

Subject		Skills												Of 20 Total																							
		Of 3 Gen Org			Of 4 Planning			Of 3 Inspection			Of 4 Regulation					Of 3 Verification			Of 3 Correction																		
		Y	N	S	Ex	Sp Ex	Y	N	S	Ex	Sp Ex	Y	N			S	Ex	Sp Ex	Y	N	S	Ex	Sp Ex														
A	3	0	0	(0)	[0]	1	0	3	(4)	[2]	2	1	0	(3)	[1]	1	1	2	(3)	[1]	2	0	1	(2)	[0]	1	0	2	(2)	[0]	20	10	2	8	(16)	[4]	20%
B	0	1	2	(2)	[1]	2	1	1	(4)	[2]	2	1	0	(3)	[1]	2	1	1	(4)	[2]	3	0	0	(2)	[1]	2	0	1	(3)	[3]	20	11	4	5	(18)	[10]	50%
C	1	0	2	(1)	[1]	2	0	2	(4)	[4]	2	0	1	(3)	[3]	2	0	2	(3)	[3]	2	1	0	(2)	[1]	2	0	1	(3)	[3]	20	11	1	8	(16)	[15]	75%
D	2	0	1	(2)	[1]	2	1	1	(3)	[3]	2	0	1	(2)	[2]	0	0	4	(4)	[3]	2	1	0	(1)	[1]	1	0	2	(3)	[2]	20	9	2	9	(15)	[12]	60%
E	0	0	3	(2)	[1]	1	0	3	(4)	[2]	1	1	1	(3)	[2]	0	1	3	(3)	[2]	0	1	2	(3)	[3]	2	0	1	(2)	[2]	20	4	3	13	(17)	[12]	60%
F	1	0	2	(2)	[1]	2	1	1	(2)	[0]	0	2	0	(0)	[0]	1	3	0	(1)	[0]	0	2	1	(2)	[0]	0	0	2	(3)	[0]	18	4	8	6	(10)	[1]	5.5%
G	1	0	2	(3)	[3]	3	0	1	(4)	[3]	3	0	0	(3)	[2]	1	3	0	(3)	[3]	3	0	0	(2)	[2]	2	1	0	(2)	[2]	20	13	4	3	(14)	[12]	60%

Abbreviations: Gen Org: General Organization
Y: Yes
N: No
S: Sometimes
Ex: Example
Sp Ex: Spontaneous Example
O: Overall
%: Percent

The reason for keeping the equivocal label somewhat more general than those labels used for the instructors' format was based on the differences in how the questionnaires were administered to each group. While teachers read the Questionnaire and then checked a category of their choice, the students took part in an oral interview. The examiner found that it was too subjective to assign specific labels to statements which indicated a variation in use of a particular strategy. Labels were therefore kept to the two dichotomous stands of "yes" and "no" and a third descriptor which would indicate a mid-level response.

In viewing the summarative results of the response labelling outlined in Table 88, it is seen that subjects on the whole viewed themselves as being more organized than disorganized. Four of the subjects (Subjects A, B, C and G) made strongly affirmative responses to half or more of the questions posed to them. Subject D made the same number of "sometimes" statements as affirmative responses, while Subject E's replies were predominantly situation-dependent. Only Subject F made more strongly negative responses than affirmative or situation-dependent responses.

Most subjects could be probed into expanding on simple agreements or disagreements. These expansions are recognized under "example" in Table 88. However, when only those examples given spontaneously are counted, there is a marked drop in the number of expansions noted (see Table 88). Subject C used the greatest number of spontaneous examples with seventy-five percent of his responses being amplified without request. Three subjects (Subjects D, E and G) used examples

spontaneously in sixty percent of their responses while Subject B did so in fifty percent of his answers. Subjects A and F offered considerably lower proportions of spontaneous examples of twenty and five and a half percent respectively. Both subjects A and F could be termed culturally different with Subject F also being of very low socioeconomic status.

Results of Analysis Described in Steps Twelve Through Fourteen

Each subject's responses to the questions on the Questionnaire on Organizational Skills were quantified. Affirmative responses were assigned a 3, "sometimes" responses a 2, and negative responses a 1. By totalling the number of possible points for the responses making up a particular category and indicating how many points had been achieved, ratio scores were devised for each of the six organizational areas (see Table 89). So that comparisons could be made more easily between areas, ratio scores were converted to decimal scores (see Table 90). Using this method it was possible for one subject to have equivalent scores in more than one area. In examining the skill areas one sees that the greatest number of subjects (three) achieved their highest ratings in General Organization and Inspection skills. The skill areas of Planning and Inspection received no highest ratings and Regulation skills were rated lowest by three subjects, making it more clearly a generalized area of difficulty. General Organization, with two lowest ratings as well as three highest ratings, was not as clearly a generalized area of achievement.

Table 89
Quantified Scores of Responses to Categories of Questionnaire Regarding Organizational Skills

Subject	Skill					
	General Organization	Planning	Inspection	Regulation	Verification	Correction
A	9/9	9/12	7/9	8/12	8/9	7/9
B	5/9	9/12	7/9	9/12	9/9	8/9
C	7/9	10/12	8/9	10/12	7/9	8/9
D	8/9	9/12	8/9	8/12	7/9	7/9
E	6/9	9/12	6/9	7/12	5/9	8/9
F	7/9	9/12	*2/9	7/12	4/9	*4/9
G	7/9	11/12	9/9	5/12	9/9	7/9

Numerator = Subject's score Denominator = Possible score
*lowered artificially due to misunderstanding, omission or inaudible response

Table 90
Highest and Lowest Ratings of Responses to Categories of Questionnaire Regarding Organizational Skills

Subject	Skill					
	General Organization	Planning	Inspection	Regulation	Verification	Correction
A	(1)	.75	.78	.67	.89	.78
B	.55	.75	.78	.75	(1)	.89
C	.78	.83	(.89)	.83	.78	(.89)
D	(.89)	.75	(.89)	.67	.78	.78
E	.67	.75	.67	.58	.56	(.89)
F	(.78)	.75	*.22	.58	.44	*.44
G	.78	.92	(1)	.42	(1)	.78

Circled score is the highest for that subject. Squared score is the lowest for that subject.
* lowered artificially.

One of the most important findings of the study was that three of the four subjects (Subjects A, D and G), who rated themselves as poorest in regulation skills (see Table 91) were those who could not regulate their task behaviour on the Rods and Text Search Tasks even though they could verbally explain how to do the tasks (see Table 39). Subject E, the other subject who rated himself low in regulation skills, was able to regulate his actions in the Rods Task but could not do so in the Text Search Task.

Results of Analysis Described in Step Fifteen

In comparing subjects' ratings of themselves to their teachers' ratings, a wide range of similarities and differences may be seen (see Tables 91 and 92). In general, it may be said that the teachers in less academic settings were more likely to have ranked organizational skills in the same way as the students had ranked them when it came to students' difficulties or low rankings. Subjects B, C, E and F ranked themselves lowest in the same organizational skills that their teachers in less academic settings had seen as these students' weakest areas. Only one academic teacher ranked a student lowest in the same skill area which the student himself had seen as most troublesome (Subject F). Highest rankings, which agreed with the students' rankings, were more equally distributed between teachers in academic and less academic roles, with three identical rankings between students and teachers for each group.

Corresponding rankings by students and their teachers in highest and lowest ranked skills were found chiefly in two skill areas.

Table 91

Categories on the Questionnaire on Organizational Skills Assigned

Highest and Lowest Ratings

Rater	Rating	
	Highest	Lowest
Subject A	General Organization	Regulation
LAS	General Organization	Verification
AS	General Organization	Planning Correction
Subject B	Verification	General organization
LAS	Inspection	General Organization Verification Correction
AS	General Organization	Correction
Subject C	Inspection Correction	General Organization Verification
LAS	General Organization	Verification
AS	General Organization	Inspection
Subject D	General Organization Inspection	Planning Regulation
LAS	Planning	Correction
AS	General Organization	Inspection
Subject E	Correction	Verification
LAS	Correction	Verification
AS	General Organization	Regulation

(table continues)

Rater	Rating	
	Highest	Lowest
Subject F	General Organization	* Inspection * Correction Verification
LAS	General Organization	Inspection Verification
AS	General Organization	Correction
Subject G	Inspection Verification	Regulation
AS1	General Organization	Verification
AS2	General Organization	Verification

Abbreviations: LAS = Less Academic Setting
AS = Academic Setting
AS1 = Academic Setting One
AS2 = Academic Setting Two

*lowered artificially

Three subjects (Subjects A, D and F) and their "academic" teachers rated General Organization skills most highly. Subjects A and F and their teachers from less academic settings also rated General Organization as highest. Subject E and his "less academic" teacher rated his correction skills most highly (see Table 93). Students and their teachers agreed most often that Verification skills were low. Subjects A, E, F and their "less academic" teachers agreed in this ranking, while one of Subject G's "academic" teachers made the same low ranking as he had when reporting on Verification skills. Subject

Table 92

Categories on the Questionnaire on Organizational Skills Assigned Highest and Lowest Rankings by Subjects and their Teachers

Highest Rankings							Lowest Rankings					
GenOrg	Plan	Inspect	Regulate	Verify	Correct		GenOrg	Plan	Inspect	Regulate	Verify	Correct
Subject A Teacher LAc Teacher Ac	⊗ *⊗ *⊗									✓		
								✓			✓	
												✓
Subject B Teacher LAc Teacher Ac	▽ ⊗ ⊗			✓			⊗ ▽ ⊗				✓	
			✓									✓
Subject C Teacher LAc Teacher Ac	*⊗ *⊗ *⊗		⊗		✓		⊗		⊗		⊗ ⊗	
Subject D Teacher LAc Teacher Ac	⊗ ⊗	▽ ✓	✓					✓ ▽ ✓		✓		✓
Subject E Teacher LAc Teacher Ac	✓				⊗ ⊗					✓	⊗ ⊗	
Subject F Teacher LAc Teacher Ac	⊗ *⊗ *⊗								⊗ ⊗		⊗ ⊗	⊗ ⊗
Subject G Teacher Ac ¹ Teacher Ac ²	* * *		✓		✓				✓		* * *	
Total		14	1	4	0	2	3	3	3	4	10	5

Abbreviations: LAc: Less Academic Setting
Ac: Academic Setting
Ac¹: Academic Setting One
Ac²: Academic Setting Two
GenOrg: General Organization

Circled scores indicate student/teacher agreement.
Squared scores indicate student/teacher disagreement.
Square over circle indicates both agreement and disagreement.
* indicates that the teachers agree
Δ indicates that the teachers disagree

F and his teachers also ranked him lowest in Inspection (less academic setting) and Correction (academic setting) skills.

Student/teacher disagreement on highest and lowest rankings was seen in the discrepancy between Subject B and his academic teacher regarding his General Organization skills. He reported problems not perceived by his teacher. Subject C's rankings conflicted with both his teachers' ratings. His "academic" teacher and "less academic" teacher both saw his strength in General Organization, his perceived "lowest ranked skill". He ranked himself highest in Inspection skills, the area ranked lowest by his academic teacher.

Teachers in academic and less academic settings agreed that subjects A, C, F and G were best in General Organizational Skills. Only one student was rated lowest in one skill by two teachers. Interestingly, the subject in question was Subject G, the only subject who was rated by two teachers from academic settings. Both of Subject G's teachers rated him lowest in Verification Skills (see Table 93). In summary, there was more agreement by teachers in academic and less academic situations among themselves when it came to ranking what they perceived as their student's best skill areas. Thus there was more conformity of opinion between teachers of the same pupil regarding their student's Highest Rankings than there was regarding his Lowest Ranking.

Teachers in academic settings rated subjects oppositely from teachers in less academic settings when rating highest and lowest organizational skills for the same subject in only two instances. Subject B was ranked highest in General Organization skills by a

Table 93

Classification of Responses to the Questionnaire on Organizational Skills as to Length and Preciseness

Total Verbalization Units			Words				Comments				Elaborations				Questions							
			General		Precise		General		Precise		General		Precise									
Subject	Overall	Own(%)	A/D/P	Total	Own	A/D/P	Total	Own	A/D/P	Total	Own	A/D/P	Total	Own	A/D/P							
A	86	29(34%)	*57	*45	*6	*39	*2	*1	1	27	17	*10	11	5	*6	1	1	0	0	0	0	
B	*102	72(71%)	30	25	5	20	0	0	0	*41	*31	*10	5	5	0	*17	*17	0	10	10	0	4
C	63	50(79%)	13	13	3	10	0	0	0	16	14	2	11	10	1	4	4	0	*17	*17	0	2
D	48	33(69%)	15	11	3	8	1	0	1	8	3	5	6	5	1	7	7	0	15	15	0	
E	82	*73(89%)	9	9	4	5	*2	*1	1	25	24	1	*18	*15	3	8	7	1	16	16	0	4
F	55	27(49%)	28	26	1	25	*2	*1	1	14	13	1	12	11	1	0	0	0	1	1	0	
G	76	58(76%)	17	15	3	12	*2	0	*2	21	18	3	10	9	1	11	11	0	*17	*17	0	

Note: Because of the manner in which the transcripts were divided into Meaning Units as well as the interactive nature of the discussions, the distinction between comment and elaboration is not based entirely on a natural linguistic unit.

Circled numbers indicate the highest number of his own responses in a category for that subject.

Squared numbers indicate the highest number of total responses in a category for that subject.

Underlined numbers indicate the highest number of A/D/P responses in a category for that subject.

* numbers indicate the subject whose number of responses is highest in that category.

Abbreviations: %: percent
A/D/P: Agree/Disagree/Parrot

teacher in an academic setting and lowest in the same skill by one of his teachers in a less academic setting. Subject D's "academic" teacher ranked him highest in Planning skills, the same area in which his "less academic" teacher ranked him as lowest.

Results of Analysis of Steps Sixteen and Seventeen

In breaking meaning units from the transcripts down into words, comments and elaborations, definite patterns developed for individual subjects. The further step of describing each of the three classifications as General and Precise also yielded valuable information.

As can be seen by Table 93, idiosyncratic patterns developed. In viewing total responses in each category, two subjects (Subjects A and F) had the majority of their verbalizations classified as General Words. Three other subjects (Subjects B, E and G) had the highest number of responses classified as General Comment. The two remaining subjects (Subjects C and D) had the majority of their statements classified as Precise Elaborations.

These patterns changed only somewhat when considering just the responses which were the subjects' own spontaneous statements; that is, statements which were not merely agreements or disagreements or parrotings of the examiner's words. Subjects A and F in this investigation are seen to make more General Comments than any other type of response. All other subjects' own verbalizations maintained the same patterns as when total responses in each category were considered.

It is interesting to note the variation from subject to subject in the use of personalized responses and the use of statements which either parrot the examiner or act as simple agreements or disagreements with her words. The range of percentages of the subjects' own spontaneous responses vary from thirty-four to eighty-nine percent which are the percentages of Subject A and Subject E respectively. Four other subjects (Subjects C, G, B and D) had percentages between seventy-nine and sixty-nine. Subject F, like Subject A, had a much lower incidence of use of his own verbalizations, having a percentage of only forty-nine. All subjects tended to agree/disagree or parrot General Words more than any other category of responses (see Table 93).

Global Statements Regarding Organizational Ability

Each subject was asked whether or not he viewed himself as being organized. Two subjects, (Subjects A and B) saw themselves as organized, two, (Subjects F and G) as disorganized, and the remainder felt their organization was dependent on circumstances. In Table 94 the subjects' opinions of their organizational ability is compared with their teachers' opinions. For four subjects there is some degree of agreement between self-opinion and teacher opinion. Subjects F and G were seen as disorganized by both of their teachers while Subject D and E's opinions regarding situational organization seem to be supported in that they are seen as being disorganized in academic settings but organized in nonacademic settings. Once again Subject A stood apart from the others being the only subject whose opinion differed from both of his teachers.

Table 94

A Comparison of Self and Teacher Organizational Classifications

Subject	Self	Academic Setting	Less Academic Setting
A	Organized	Disorganized	Disorganized
B	Organized	Disorganized	Organized
C	Depends - fairly organized	Organized	Organized
D	Sometimes organized, sometimes not	Disorganized	Organized
E	Organized - sometimes disorganized, I've been told	Disorganized	Organized
F	Disorganized	Disorganized	Disorganized
G	Disorganized	Disorganized Disorganized	n/a

INTERVIEW REGARDING STUDY HABITS

Note: Procedural steps from Chapter IV: Methodology, are repeated here. (See Appendices W through Z for analysis details.)

Procedure

The interview under discussion was based on the subjects' knowledge and feelings regarding their abilities and study habits. These interviews were analyzed in a manner similar to that utilized by Giorgi (1975). The steps in the analysis included data reduction and interrogation of the verbal protocol and were as follows:

Step One:

All exchanges were transcribed verbatim.

Step Two:

The subjects' verbalizations were segmented into meaning units by examining the transcripts in an open manner with as little consideration of the aims of the study as possible.

Interview Transcription (Subject C)

Examiner: O.K., so you think that the main reason why people do well in school is that they take the time and put more effort into it.

Subject C: Umhum.

Examiner: Anything else?

Subject C: Mmm, [things come easier to them.

Examiner: What do you mean by things?

- Subject C: Umm, they find it easier to, umm, learn things, and learn, you know, the subject, and uh things like that.] 14
- Examiner: O.K. What do you do when you're left pretty well on your own to do an assignment like, say, writing an essay? What would you do in a situation like that?
- Subject C: Umm. [Study up on it and make notes on what it says and take the text and whatever we've got to study from and then I don't think if a person takes it just right out from the book, they're not learning anything, obviously, and I try to put it in my own words,] whether, 15
you know, sometimes [I try to get the point across and don't really so I don't do so well and then others I will do quite well.] 16
- Examiner: Umhum. So you feel quite comfortable about doing something like that on your own.
- Subject C: [Umhum, oh, yeah.] 17
- Examiner: And that's the procedure you follow.
- Subject C: I don't, yeah, [I don't like working with another person, you know, because that tends to ruin it [Laughs] They don't, together, we don't get exactly the right, you know, we spend more time talking and doing something else than working and it doesn't turn out so well.] 18
- Examiner: O.K. You said the "other materials." What would be some of the materials that you would use?
- Subject C: [Um, well, it would depend on what it is, like if we're doing (indiscernible) then it would be more of an encyclopedia, something like that.] 19

Step Three:

All meaning units were restated as simply as possible as themes, i.e.:

Meaning Unit #18 from Interview Transcription (Subject C)

Subject C: I don't - yeah - I don't like working with another person, you know - because that tends to ruin it. [Laughs] They don't - um - together we don't get exactly the right - you know, we spend more time talking and doing something else than working and it doesn't turn out so well.

Interview Theme #18 (Subject C)

Feels working with a partner is not efficient.

Interestingly, in the case of the less verbal students extracting an interview theme did not always mean a condensation of the unit but with some statements it meant elaborating on the terse responses, i.e.:

Meaning Unit #5 from Interview Transcription (Subject A)

Examiner: Have you ever been interested in Social Studies or English in the past? [Subject had previously singled out these subjects as difficult areas.]

Subject: No.

Examiner: It's always been something you haven't liked very much?

Subject A: Yeah.

Interview Theme #5 (Subject A)

He has never been interested in or liked Social Studies or English (response to examiner's suggestions).

Step Four:

Summary descriptors were written for each subject's

responses to the following groups of questions:

1. 1 through 2b
2. 3
3. 5
4. 4 and 4a
5. 9

Note: The above numbers correspond to question numbers from the Interview Regarding Study Habits found in Appendix J. For these summaries, both thematic statements and the original transcripts were consulted.

Step Five:

Summary tables for each of the five summaries were constructed and the results outlined. Those summary descriptions, tables and results follow the present procedural outline.

Step Six:

Each meaning unit and corresponding theme for Questions 3, 4, 6, 7 and 9 was then examined to see if it gave either an indication of the student's knowledge of his study and work habits and/or if it revealed an awareness of how he regulated those habits. The procedure was one of labelling the theme appropriately. Giorgi (1975) would refer to this procedure as interrogating the data in terms of the questions of the study.

Interview Theme #7 (Subject C)

Found school hard because he found it difficult to read [knowledge of] and felt he should have taken more time [awareness of the need for a regulatory action].

Decisions as to whether to place a "knowledge of" or "regulatory" label on a statement were guided by the work of Brown and Palincsar (1982) quoted in Table 95 of the present study. Essentially, knowledge about cognition was assigned to statements reflecting the subject's conscious access to knowledge of his behaviours and study habits, while regulation statements were those which revealed elements of planning, monitoring and checking outcomes. See Table 95 for an outline of the criteria derived from Brown and Palincsar (1982).

Notations were also made when the subject seemed at a loss as to what to do or used a statement reflective of lack of knowledge as to how he learned or how he could regulate his learning. Examples of such behaviours can be seen when the subject reports being totally helpless in a relatively straightforward situation and can progress only by turning the problem over to another.

Step Seven:

Following the same procedures used in Step Six, transcripts and themes were interrogated to see if "knowledge of" statements gave general or specific information.

Table 95

Criteria for "Knowledge Of" and "Regulatory" Labels Assigned to Interview Statements

Label	Criteria from Brown and Palincsar (1982)
Knowledge of	Conscious access to one's own cognitive operations Reflection about the cognitive operations of others
Regulatory	Planning - prior <ul style="list-style-type: none">- Predicting outcomes- Scheduling strategies- Using forms of vicarious trial and error Monitoring - during <ul style="list-style-type: none">- Monitoring- Testing- Revising- Rescheduling Checking outcomes <ul style="list-style-type: none">- Evaluate efficiency and effectiveness

Interview Theme 19 (Subject C)

Uses the encyclopedia if asked to write a paper
[knowledge of (general)]

Interview Theme 24 (Subject D)

Types because his writing is so poor but many
marks are lost because of typographical errors
[knowledge of (specific)]

Step Eight:

The total number of themes falling into Specific "knowledge of," general "knowledge of," and "regulatory" were ranked and compared with the rankings of the same three groupings of themes labelled as spontaneous to see if the two were constant, similar or differing. For example:

		General	Specific	Regulatory
Subject A	Total	1	2	3
	Spontaneous	1	3	2
	(Differing)			
Subject C	Total	3	2	1
	Spontaneous	3	2	1
	(Constant)			

Step Nine:

Themes and transcripts of responses to Questions 3, 4, 6 and 7 were again examined to see if the subject's statements were spontaneous or if they were parrotings of or agreements with the examiner's statements.

The labelling of statements as spontaneous versus prompted is somewhat artificial as the majority of statements were not truly spontaneous but initiated by direct questioning. Statements were labelled prompted when the examiner offered a suggestion which was subsequently responded to with a yes, no or

sometimes. For example, if the examiner said, "Do you talk out loud to yourself when you study?" and the subject said, "Yes," the theme S. talks aloud when studying was labelled as a prompted theme. Prompted labels were also ascribed to themes bearing information which the subject had merely parroted from the examiner's probes. If the subject expanded in any way on the examiner's words, his response was counted as spontaneous. For example, if the examiner said, "Have you ever tried taping?" and the subject responded, "Taping a class? I used to tape but I haven't taped this year at all," the theme has taped classes in the past but not presently was labelled as a spontaneous theme.

Note: In labelling themes, content of the verbatim transcript was essential in separating "knowledge of" from "regulatory" statements as well as determining the degree of specificity reflected by the statement. Taken out of context, the themes did not always give sufficient information for labelling.

Step Ten:

Information gleaned from the Interview, data reduction and data interrogation formed the basis for information used to compile portions of individual case studies.

Results of the Analysis Described in Steps Four and Five

Data from the Interview Regarding Study Habits from Questions 1, 2b, 3, 5, 4 and 4a, as well as 9 were interrogated according to Steps Four and Five of the procedure for data analysis were described in

the previous section of the present chapter. The format used in the following discussion presents a summary descriptor, summary table and results section for each question grouping outlined.

Knowledge and Feelings About Intellectual Ability - (Questions 1 through 2b of the Interview)

Question 2a:

Had anyone ever told you before that you had good intellectual ability? If yes, who?

Question 2b:

What did you think or how did you feel about learning that you had good intelligence?

Summary Descriptors A

Subject A

Told by friends and Math teacher within the previous two years.

Pleased

Subject B

No one had told him.

Felt he was intelligent because of his novel ideas.

Subject C

Thought he was intelligent but not good - thought something was missing cognitively.

Surprised.

Subject D

Teachers always said he had the potential but not the desire.

No reaction.

Subject E

Told by mother and a clinician when tested in Grade 5.

Good - confirmed that he wasn't stupid.

Subject F

Teachers had told him his
ideas revealed a good mind
- told about writing tests.

Didn't think much.

Subject G

Yes - Mom thought he was and
a couple of teachers said he
didn't work to potential;
however, he thought he had an
IQ of 80.

That he could use it if he
really tried.

Table 96

Summary of Knowledge and Feelings About Intellectual Ability

Subject	Did anyone ever tell you you were bright?	Who	When
A	Yes	Friends and Math teacher	In previous two years
B	No	Own feeling	No specific reference
C	* Yes, but something missing - didn't think he was good	No specific reference	No specific reference
D	Yes	Teachers	Always
E	Yes	Mother, Clinician	Grade 5
F	Yes	Teachers	After tests
G	Yes, but didn't think I was that bright	Didn't believe mother or teachers	No specific reference

*Not asked directly because of his spontaneous contribution.

Results of Questions 1 through 2b

Students' responses to this question were complex. What they had been told and what they appeared to believe were not always the same. For example, although Subject D had never been told he was intelligent, he believed in himself. Subject C also had an innate belief in himself but questioned how bright he was, as did Subject G, who, in spite of external assurances from family and back-handed compliments from his teachers, thought he had limited ability. Subjects D and F reported their teachers' reactions but not their own.

Subjects' Opinions On Why They Have Had School Difficulty - (Question 3 of the Interview)

Question 3: You have had difficulties in school. Why do you think you have had those difficulties?

Summary Descriptors B

Subject A:

Knew that he didn't know much in English or Social Studies but did not know why. When urged, said his difficulty was based on not studying very hard which he agreed may have been because of lack of interest.

Subject B:

Felt he did poorly in school because of a period of lack of discipline following his parents' divorce. He felt that his resistance to doing what he was told to

do also contributed to his problems. He preferred athletics to books.

Subject C:

Reading problems were influential and he felt that he should take more time. He believed that if he put more effort into studying his grades would improve.

Subject D:

Teachers had told him that he didn't do well because he didn't care. He tended to agree. He also agreed that reading might be a factor because it took him so long to read but he did not bring up this possibility spontaneously. Whether or not he liked a subject was a factor in how well he did. Not an academic, he liked to work with his hands.

Subject E:

He felt that he had difficulty because of reading problems and hyperactivity.

Subject F:

He began by saying that he had no idea of why he had done poorly in school. He denied that reading could ever have been a problem but admitted that writing was a problem. Said he had to have heard material to remember it, that he couldn't remember what he reads. He couldn't study no matter how he tried. He was bothered as much by disinhibition as by distractions.

Subject G:

He believed his poor marks were due to the compulsory nature of school. (Said his teachers felt he should work harder; he didn't think that would help.)

Results of Question 3

All but two of the subjects could give quite spontaneous accounts of why they had not done well in school without additional prodding and all seven subjects did postulate as to why they had experienced learning difficulty. All but one subject (Subject G) looked inwards for the reason and tended to blame themselves for their school difficulty in some way or another. In all, eighteen reasons were given, with subjects offering from 2 to 5 reasons each as to why they had problems. The responses were classified into five types: don't know, attitude, academic, underlying skills and other (see Table 96). When viewed globally rather than by subject, the greatest number of reasons proffered in one category were in the area of attitude (6), with academic skills (5) and underlying skills (4) falling in second and third place in frequency hierarchy. However, when looking at the number of students making responses, the categories of attitude and academic skills were mentioned by the same number of students (4) and the most students. The three remaining categories had the same number of student responses each (2).

The single reason for school difficulty mentioned most frequently (3 times) was in the academic skills category; namely, reading. However, considering the degree of difficulty experienced by the

Table 97

Subjects' Opinions On Why They Have Had School Difficulty

Subject	Don't Know	Attitude				Underlying Skills			Academic			Other		
		More Effort	Not Studying	Not Interested	Doesn't Care	Resists	Hyper	Distract.	Lacks Con- centration	Memory	Reading	Writing	Not Knowing Subj. Matter	Family
A	✓		✓	(✓)	✓							✓		
B						✓								✓
C		✓								✓				
D					✓					(✓)				
E						✓				✓				
F	✓						✓	✓	✓		✓			
G														✓
	1/7	1/7	1/7	1/7	2/7	1/7	1/7	1/7	1/7	3/7	1/7	1/7	1/7	1/7
	2/19			6/19			4/19				5/19		2/19	
	2 students' responses included			4 students' responses included			2 students' responses included				4 students' responses included		2 students' responses included	

Circle means that subject agreed with suggestions of interviewer.

subjects used in the present study (see Table 6), one might have expected an even higher frequency of this response.

Although six of the seven subjects had some degree of inhibiting reading problem, only two spontaneously suggested that the deficit had contributed to school failure. A third agreed with the suggestion that such a disability may have contributed to his problems, while a fourth flatly refused to consider such a possibility although he agreed that poor writing skills were a problem. In short, four of the six subjects had not considered the link between their reading difficulty and their school failure to the extent that they would mention it spontaneously in an interview of this nature. None of the subjects brought forth any reason which might be described as a reference to poor organizational skills or strategy problems as a reason for poor marks. At this point in the interview no one mentioned failure to achieve as being dependent on low ability. It is possible that this profile was in part influenced by the previous assurance of adequate ability.

Subjects' Opinions of Why Some Students Do Well in School - (Question 5 of the Interview)

Question 5: Why do some people do well in school?

Summary Descriptors C

Subject A:

He felt students do well because they like the

subject. (May have been influenced by examiner.)

Subject B:

May do well in a lot of subjects but may not do well in athletics. Achievement in school means that you can finish something you've started. (Not a direct answer.)

Subject C:

People do well in school because they take a lot of time and they work. Things come easier to those who do well.

Subject D:

Key to doing well is to like the subject; good academics care about marks and work to better themselves.

Subject E:

It comes to them easily and they are naturally smart.

Subject F:

Trying harder, luck of birth, and high IQ contribute to school success. People who keep thoughts in their heads easily do well.

Subject G:

Students do well because of their enjoyment of school, because they have plans and they want to get better marks than their friends.

Results of Question 5

The idea of good students having subject matter come easily to

Table 98

Summary of Opinions on Why Some Students Do Well in School

Subject	Action			Ability			Attitude					
	Plan	Work	Put In Time	Comes Easy	Keep Thoughts	IQ	Care	Want to be Better	Competitive	Resolute	Likes Subject	Enjoys School
A											✓	
B										✓		
C	✓		✓	✓								
D							✓	✓			✓	
E				✓								
F				✓	✓	✓						
G	✓								✓			✓
	1/7	1/7	1/7	3/7	1/7	1/7	1/7	1/7	1/7	1/7	2/7	1/7
	3/15			5/15			7/15					
	2 students' responses included			3 students' responses included			4 students' responses included					

Numerator: Number of students exhibiting the characteristic
Denominator: Total number of students

Numerator: Number of students in category
Denominator: Total number of opinions given

them was the most frequently given answer to the question, "Why do some people do well in school?" Three subjects of the seven gave answers of that nature; however, one of the three saw hard work and willingness to put in time as contributing factors as well.

When the ideas were grouped in three categories: action, ability, and attitude (see Table 97), the global approach once again showed that the greatest number of responses were in the attitude category (7), followed by ability (5) and then action (3). This hierarchy remained the same when viewing the number of students contributing suggestions in each category: 4, 3 and 2.

One subject suggested that the ability to plan contributed to school success.

Comparison of Responses On School Success and Academic Difficulty

The most frequently voiced single reason for not doing well in school was because of reading problems, while the most frequently suggested single reason why some students do well was that things came easily to them. Categorically, however, students' reasons for both achievement in others and lack of achievement for self were predominantly suggestions describing attitude. In outlining the reasons why people achieve success in school, numbers of students making responses were highest in the attitude category. When giving reasons for school failure, the same number of students contributed ideas which were categorized as attitude as gave responses which dealt with academic skills.

Subjects' Opinions on Experiences with Subject Areas in School -
(Question 4 and 4a of the Interview)

Question 4: Were some subjects harder than others?
If yes, which ones were the hardest and why?

Summary Descriptors D

Subject A:

Social Studies and English were most difficult. He had never liked or been interested in them. Chemistry was his favourite--interest based on liking chemicals. He found it easier to learn something he liked. He thought that everything was easier than Social Studies and English.

Subject B:

Didn't see some subjects as harder than others--it was usually that he wanted to do something else.

Subject E:

English hard. He felt he used to be good in Math but that the increased reading component had made it hard. Physical Education was easy. He hated Spelling and had hated it throughout his school career.

Subject F:

Did best in alternate courses.

Subject G:

Math and Science had been difficult. He could not remember Math--blamed science difficulties on a poor

teacher. Math and Science were hard because of preconceptions and content.

Table 99

Positive and Negative Experiences with School Subjects

Subject	Hard	Easy or Liked
A	- Social Studies - English	Chemistry
B	none harder/easier	Depends on his involvement
C	- English - Language Arts	Science
D	- English - Psychology	Autobody Science Physical Education Outdoor Education
E	- English - Spelling	Physical Education
F	- Regular academic subjects	Alternate Courses
G	- Math - Science	None mentioned

Results of Questions 4 and 4a

Five of the seven subjects mentioned English as being a problem in some context of their school careers. The most commonly mentioned subject of interest or ease was Science with three students selecting some aspect of this subject to speak about in positive terms.

Subjects' Approaches to Studying for Exams - (Question 9 of the Interview)

Question 9: Suppose you have an exam tomorrow. Tell me what you would do to prepare for it.

Summary Descriptors E

Subject A:

(Examiner has feeling she is drawing out each thought.) Said he would study to prepare for exam. He would do this by reading books at home (but had no books for exam coming up in near future). He reported that he reads notes, writing down the main points, but does not talk out loud. He uses text, looking for important points. He felt that his most important strategy was to read notes. He said he uses his lab book in Chemistry. Subject A has family members question him about content. He always studies and studies harder for subjects he does not like.

Subject B:

Subject B equated memorizing stuff with preparing for exams. He outlined a strategy he used for remembering a series of points. He reads them over first and then he memorizes the first couple of letters of each point. He had used the technique in a psychology exam the previous week. He finds that relaxation helps his

studying. He said that the number of repetitions used to commit material to memory varies with the scope or amount of material to be learned. He was not clear regarding the range of those repetitions. In speculation, he supposed one could effectively use syllables, suffixes, or prefixes to trigger memory. He also finds that objects or furnishings in the classroom stimulate his memory for things learned there. He never asks anyone to hold his book and ask him questions nor does he talk aloud to himself.

Subject C:

In preparing for exams, Subject C skims over the parts of his notes he knows well. However, parts he knows less well he would first clarify, expand, then read them a couple of times. Studying to him is sitting down and reading material. When first questioned about speaking aloud, he felt he did not use that study technique, saying he just thought the material over. However, when he talked about memorizing terms, he said he read the term several times, then left his notes, talked to himself and if what he said wasn't correct he would go over his notes again and then verbalize the material once more. He also reported taking notes when studying by pulling main points and using point form recordings.

Subject D:

Subject D began his comments on exams by saying that he had never studied hard for a test and wouldn't study hard for a test and would not study hard for English. The only thing he reported doing for English was to practise reading fast so he could get through the short stories which tended to make up the exams. For a tools exam (part of Autobody) he was reading over his text (primarily pictures) twice a night, nightly, during T.V. commercials. He also reads his text in Food Science. He never tries to tell himself material aloud but does read aloud. He had someone ask him questions in Math last year but was not employing this method at the time of the present study.

Subject E:

For the previous two years, Subject E had done nothing to prepare for examinations. Reviewing brought a nervousness that was debilitating in exams. Not studying brought him to the examination in a calmer state. At the time of the interview, however, he was going over his Biology notes for an upcoming exam. He felt he was doing very badly and wanted to "get" the subject. He was reading over his notes and redoing assignments as well as going through the textbook using both the pictures and the print (he had spoken earlier of his reliance on pictures when using textbooks). He

reads over material and repeats it. His notes are usually obtained from a friend. He tries to listen carefully in class rather than take notes because concentrating on spelling hampers his ability to take notes. Although he has taped classes in the past (Grades 10 and 11), he feels self-conscious about taping and would feel more relaxed if he were not the only one taping.

Subject F:

Subject F would attempt to study his notes at home for an upcoming exam but he would be unable to concentrate and so he would not study. Even when alone, he does not work effectively. He never studies from his textbooks. He used to have someone ask him questions but doesn't anymore, even though he perceived it as being helpful. He reads aloud and questions himself, but in his attempts to talk to himself he is easily distracted by his own thoughts or perhaps the T.V. set. Even though his room is quiet he thinks about things in the room. He finds the school library noisy whether or not it is crowded. He felt the public library might be a place where he could be totally alone but felt sure that his mind would still wander. Although he can become totally absorbed in a T.V. show, he finds studying and all subjects boring. He said that he can concentrate on T.V. because he wants to

concentrate. Even if he enjoys a particular class, he cannot study for it. He has never had any help in learning to study.

Subject G:

Subject G would study at home, sleeping and eating first, then reading and interpreting his notes. He concentrates on notes emphasized by the teacher. He reads part of the texts which are important. He said he didn't think he talked aloud when he studied but admitted that his mother often asked who he was talking to when he was working alone in his room. He practises equations in Math but initially did not remember doing any other writing even though his teachers encourage study notes. Later he said that he wrote out some difficult words after reading them and pronouncing the difficult part of the word in a literal phonetic manner.

Note: further questioning often prompted memories of employing a denied study strategy. These memories were also triggered by explaining specific aspects of preparations.

Results of Question 9

Three of the subjects made it clear that they did not engage in regular preparation for examinations. Subject D had never studied hard in the past but was selectively preparing at the time of the interview because of his desire to do well in autobody. Despite his minimal reading skills he was close to the top of his class in

Table 100

Summary of Students' Approaches to Studying for Exams

Subject	Redoing Assignments	Reads Text	Reads Notes	Reads Other Books	Reads ALOUD	Talks ALOUD	Writes Material	Another Questions	Picture	Other
A	(tab book)	(✓) looks for main points	Δ/	✓	=	(no)	main points of notes	(✓)		
B	-	-	-	-	-	no	(✓)	no	-	memorizes first letter of points to be remembered
C	-	-	-skins well known -difficult parts clarified, expanded, gone over couple of times	-	terms from notes	Δ (no) terms from notes later	(✓) main points in point form	(no) not helpful	-	-
D	-	✓	-	-	✓	(no)	✓	(✓) in past not now	✓	practises reading fast
E	✓	✓	✓	-	-	(✓)	-	-	✓	-
F	-	(no)	(✓)	-	✓	(✓) tries--gets distracted questions himself	-	(✓) in past	-	-
G	✓	(*) important parts	(*) particularly parts emphasized by teacher	-	(no)	(✓) qualified	Δ (no) difficult words	-	-	interprets notes
	3/7Y	4/7Y	5/7Y	1/7	3/7Y	4/7	5/7	3/7Y	2/7Y	
	0/7N	1/7N	0/7N	0/7	1/7N	3/7	0/7	2/7N	0/7	
	4/7NM	2/7NM	2/7NM	6/7NM	3/7NM	0/7NM	2/7NM	2/7NM	5/7NM	

Δ later gave conflicting information; counted as positive response.

Circle: direct response to E's questions. Points triggered by E but not a direct response to E are not circled (not verbatim)

Those included: Do you use your notebook or textbook? Do you write? Do you include only the important points?

Y: Yes N: No NM: Not mentioned Numerators: Number of students fitting the category Denominators: Total number of students

autobody. Subject E had opted out of studying because of the extreme nervousness it created in him. He had for two years found he was calmer going into an exam without having done any preparation than he was attempting to learn material. A dyslexic whose difficulties extended to all symbol systems, Subject E was at the time of the interview breaking his never-study rule in order to prepare for Biology, a subject which was crucial in his career aspirations. Subject F usually attempted to study but found that his thoughts and the environment impinged on his concentration until he gave up.

Overall, most of the subjects seemed to know many of the things to do when studying (see Table 100) although the efficiency of their approaches might be questioned. Subject D utilized his text but only devoted time while commercials were on T.V. Subject C did not want to engage in being questioned about exam material as he did not want to face knowing what he did not know. He saw no positive offshoots of such information. Subject B appeared much more interested in the process of retaining than understanding content.

None of the subjects gave the impression that they studied fervently. Of the seven subjects, Subject C's description included the most specifics, giving the impression that he had a fairly established routine in approaching examinations.

The most frequently employed tactics were writing out material in one form or another and reading classroom notes (five out of seven students). The next most frequently utilized study techniques were reading texts and talking aloud (four out of seven).

Subjects discussed a total of four kinds of monitoring strategies

which they utilized: redoing assignments, talking aloud, writing out material, and having another person question them. Only one subject limited himself to one strategy while two subjects employed three separate strategies (see Table 101). The remaining subjects used two strategies.

Table 101

Number of Monitoring Strategies Used by Subjects During Exam Preparations

Subject	Number of Strategies
A	3
B	1
C	2
D	2
E	2
F	2
G	3

Results of the Analysis Described in Steps Six Through Nine

Data from the Interview Regarding Study Habits from Questions 3, 4, 6, 7 and 9 were interrogated according to Steps Six through Nine of the procedure for data analysis described earlier in the present chapter. Labelling of themes into the appropriate classifications and categories was done and a summary of the quantified data as it

describes those areas is found in Table 102.

When interrogating the data from the viewpoint of "knowledge of" versus "regulatory" themes, it becomes apparent that all subjects made more "knowledge of" statements than "regulatory" statements when the total number of themes are examined (see Table 102). This pattern changes little when all statements prompted by the examiner are removed from the data. In examining spontaneous statements only, it is seen that Subject C's themes were labelled "regulatory" with equal frequency to being described as "knowledge of" statements (see Table 102).

When the data is viewed somewhat more closely by expanding the "knowledge of" category to specific and general subcategories and comparing them to the number of regulatory themes, a somewhat different pattern is seen. In this instance there are three divisions to examine across total and spontaneous groupings (see Table 103). When viewing the total themes, two subjects, Subjects B and C, have more "regulatory" statements than any other. This pattern does not change when only spontaneous themes are grouped; the same two subjects have the highest number of themes classified as "regulatory." The same consistency in subjects whose themes were assigned general "knowledge of" labels more frequently than other descriptors is seen from the total to spontaneous categories.

Subjects A, E and F made statements which tended to be general in nature (see Table 103). Subject F also retained the same classification across categories. In his case, his themes had equal numbers of specific and general "knowledge of" descriptors. Only

Table 102

A Comparison of the Number of Total and Spontaneous Themes in
"Knowledge of" and "Regulatory" Classifications Derived from the
Interview Regarding Study Habits Data

Subject	Knowledge of		Regulatory	
	Total	Spontaneous	Total	Spontaneous
A	29	17	8	5
B	18	15	12	12
C	12	8	9	8
D	22	19	2	2
E	24	22	3	3
F	26	18	3	3
G	16	14	3	1

Circled number is the category with the highest number of total themes.
 Squared number is the category with the highest number of spontaneous themes.

Subject D's classification changed from category to category. He made the same number of general and specific "knowledge of" statements when his total theme production is examined. However, when only his spontaneous verbalizations are considered, he makes more specific "knowledge of" statements than any other kind.

Classifications across total and spontaneous categories are also quite stable when viewing the data in terms of types of expressions used least (see Table 103). In both categories, Subjects D, E, F and

Table 103

Numbers of Statements Reflecting 'Knowledge Of' and 'Regulatory' Functions from Questions 3, 4, 6, 7 and 9 of the Interview of Study Habits

Subject	Knowledge Of						Regulatory						Total		
	General			Specific											
	Spon	Prom	Total	Spon	Prom	Total	Lack	Spon	Prom	Total	Lack	Spon		Prom	Lack
A	13	7	(20)	4	5	(9)	1	5	3	(8)	1	22	15	2	39
B	8	1	(9)	7	2	(9)	0	12	0	(12)	0	27	3	0	30
C	2	2	(4)	6	2	(8)	0	8	1	(9)	0	16	5	0	21
D	9	2	(11)	10	1	(11)	0	2	0	(2)	0	21	3	0	24
E	12	1	(13)	10	1	(11)	0	3	0	(3)	0	25	2	0	27
F	9	4	(13)	9	4	(13)	2	3	0	(3)	0	21	8	2	31
G	8	2	(10)	6	0	(6)	0	1	2	(3)	1	15	4	1	20

Abbreviations: Spon: Spontaneous
Prom: Prompted

G make fewer "regulatory" statements than other classifications and Subject C makes fewer general "knowledge of" statements. Subject B's spontaneous themes were classified as specific "knowledge of" fewer times than any other classification while, when his total number of themes were considered, both specific and general labels were ascribed equally and less often than "regulatory" labels. Subject A presents a very idiosyncratic picture. In his case there is a considerable difference between the total and spontaneous categories, the first being "regulatory" as the least used type of verbalization and the second being specific "knowledge of" statements.

Overall, subjects tended to use general "knowledge of" statements most frequently and "regulatory" statements least often (see Table 104). Comparisons across total and spontaneous categories differed with only one subject when comparing most frequently assigned labels and with two subjects when viewing the data in terms of least used descriptors.

Ranking of the three classifications of specific "knowledge of," general "knowledge of," and "regulatory" across total spontaneous categories allowed a further examination of the constancy of performance and the effect of examiner prompts on the verbalizations. Table 105 shows the results of these rankings as well as the ascribed labels of constant, similar or differing.

The data for four subjects (Subjects C, E, F and G) showed constant rankings. Subjects B and D had similar rankings. In these cases, identical scores on two classifications were made. Subject A was again idiosyncratic, with themes ranked in differing order from

total to spontaneous classifications.

Table 104

A Comparison of Highest and Lowest Numbers of Total and Spontaneous Themes in "General Knowledge Of," "Specific Knowledge Of" and "Regulatory" Classifications Derived from the Interview Regarding Study Habits Data

Subject or Category	Highest Total	Highest Spontaneous	Lowest Total	Lowest Spontaneous
A	General	General	Regulatory	Regulatory
B	Regulatory	Regulatory	* General/ Specific	Specific
C	Regulatory	Regulatory	General	General
D	* General/ Specific	Specific	Regulatory	Regulatory
E	General	General	Regulatory	Regulatory
F	* General/ Specific	* General/ Specific	Regulatory	Regulatory
G	General	General	Regulatory	Regulatory
Specific	0	1	0	2
General	3	3	1	1
General/ Specific	2	1	1	0
Regulatory	2	2	5	4

*Equal numbers of general and specific "knowledge of" statements.

Table 105

A Comparison of Rankings of "Specific Knowledge of," "General Knowledge of" and "Regulatory" Classifications on Total and Spontaneous Categories in the Interview Regarding Study Habits

Subject	General Knowledge of		Specific Knowledge of		Regulatory		Comparison
	Total	Spon	Total	Spon	Total	Spon	
A	①	1	2	3	3	2	differing
B	2	2	2	3	①	1	similar
C	3	3	2	2	①	1	constant
D	①	2	①	1	3	3	similar
E	①	1	2	2	3	3	constant
F	①	2	①	2	3	3	constant
G	①	1	2	2	3	3	constant

Circled figures represent first ranked in total themes.

Squared figures represent first ranked in spontaneous themes.

Curved line underlinings represent last ranked in total themes.

Straight line underlinings represent last ranked in spontaneous themes.

Abbreviation: Spon = Spontaneous

SUMMARY OF RESULTS

Throughout the Results chapter, summary sections have been inserted to help to focus the outcomes of the data analysis. Highlights of the major trends will be outlined again here. These results are meant to be descriptive rather than conclusive.

In the present study, rankings on achievement, language, and processing skills were compared with one another and with the order in which teachers had ranked the subjects' organizational skill ratings on the Questionnaire on Organization Skills. Five of seven subjects received equal or similar rankings in organizational ratings and Performance IQ as well as organizational ratings and lowest academic mark.

While all subjects were found to be strategy absent in the Rods Task, it was obvious that they learned about the requirements of the task and the variables involved by manipulating the materials. However, three subjects were unable to regulate their actions by their knowledge on the Rods Task. For those three subjects the same problem with application of knowledge was evident on the Text Search Task.

The Self-Ordered Task revealed that four of seven subjects had mean error scores exceeding the total mean errors of one or more of the normative brain damaged groups. While there was not a perfect relationship between increasing speed and increasing error count, in general it may be said that those who worked more slowly on the Self-Ordered Task also worked more efficiently. When Self-Ordered Task error (SOTE) rankings were compared with the rankings of other

measures used in the present study, it was found that five out of seven subjects had equal or similar rankings on SOTE and teacher ratings on the Questionnaire on Organization Skills. There was no correspondence between those who did poorly on the Self-Ordered Task and those who could not regulate their behaviour on the Rods Task and Text Search Task.

Results of the analysis of student responses to the Questionnaire on Organizational Skills indicated that in general, subjects saw themselves as being more organized than disorganized. An examination of subject ratings on specific organization skills revealed that the three subjects who rated themselves lowest in Regulation were the same three subjects who could not regulate their task behaviour on the Rods and Text Search tasks.

When teacher and subject ratings on specific organizational skills from the Questionnaire on Organizational Skills were compared, it was found that, in general, teachers in less academic settings were more likely to have ranked organizational skills in the same way that the subjects had rated themselves, when areas of lowest ratings were compared. Only one teacher in an academic setting ranked a subject as lowest in the same area in which the subject's responses had been least positive. The single skill most frequently rated as low, by both subjects and teachers, was Verification. Highest rankings by teachers comparable to highest rankings by students were more equally distributed between teachers in academic and less academic settings with three equivalent lowest ratings for each group. General Organization skills were ranked highest most

frequently.

There appeared to be differences in the ways teachers in academic settings and less academic settings perceived the same student. Academic teachers tended to classify students as disorganized and saw students as engaging less often in specifically described organizational behaviours. Teachers in less academic settings tended to classify students as organized and saw students as engaging more often in specifically described organizational behaviour.

The spontaneous responses made by subjects during the Questionnaire on Organizational Skills were analyzed into operationally defined categories of words, comments and elaborations. The qualifiers, precise and general, were also attributed to the verbalizations. Most subjects responded using comments (i.e., unitary ideas expressed in one phrase or in a single statement). The comments were largely general (i.e., a comment which gave only a general idea of an action or understanding and might, because of its generality, have left the reader less assured of having read a true reported action). Only two subjects used precise elaborations spontaneously. The transcripts of these subjects gave the reader a clear idea of a specific action or understanding and a sense that the subject was describing what he actually would do.

In examining the percentage of spontaneous responses made by subjects on the Questionnaire on Organizational Skills, it was apparent that the two subjects in the study who might be termed culturally different were ranked lowest and second lowest. Indeed, when all of their verbalizations were considered, it was found that

they were most likely to use single word responses, often simply agreeing with, disagreeing with or parroting, in part, the examiner's statements.

Transcripts from the Interview Regarding Study Habits were analyzed to see what subjects' verbalizations revealed about their knowledge of their study habits (statements which reflected conscious access to knowledge) and what their replies indicated regarding their knowledge of their regulations of their approaches to study (statements which reflected elements of planning, monitoring and checking outcomes). When "knowledge of" statements were compared to "regulatory" statements, it was noted that all subjects had made more "knowledge of" statements. However, when three categories were formed by dividing "knowledge of" statements into specific and general classifications, a different pattern emerged, with two subjects' verbalizations revealing more statements reflective of their regulation of their study habits than of their "knowledge of" their approach to studying.

When, during the Interview Regarding Study Habits, subjects were asked why they had school difficulty, all but one subject looked inward for reasons. Classifying those reasons into five types yielded a pattern of more "attitude" responses than any other. Only one subject spontaneously mentioned reading as a probable reason for school difficulty despite the fact that six of the subjects had experienced marked reading problems throughout their school careers.

When asked the general question "Why do some people do well in school?", subjects once again most frequently gave explanations which

were classified as "attitude" responses. The most commonly used single response, however, was an "ability" response, namely, that people do well because work comes easily to them.

In Chapter V, the trends from the analysis of subjects' responses and behaviours (on four tasks and thirty-one metacognitive questions) have been described. In the following chapter, patterns seen in individual subjects on those same elements are investigated and related to information gathered regarding intellectual ability as well as academic and processing skills. These Case Studies may be seen as foundational work in the search for subgroup characteristics present in students with poor organization skills.

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